ELECTRICAL REVIEW

[ILLUSTRATED.]

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Experimental Messages Which Flashed Through Albany.

Operators at the office of the Postal Telegraph Company on State street, Albany, witnessed a conversation carried on by wire over the largest circuit ever worked, and was the greatest telegraphic feat yet accomplished.

As explained to the Albany *Express* reporter, who dropped into the neat and business like office while the experiment was going on, the trial was a most interesting one. It appears that Special Commissioner Henry Norman, who is making a tour of the British colonies, arrived at Vancouvers on Saturday night. Yesterday he carried on a conversation over the Canadian Pacific and Commercial Company's wires. At one end of the line was Mr. Hearst, of the San Francisco *Examiner*, and at the other end Mr. Stead, of the *Pall Mall Gazette*, London.

There was an unbroken telegraph circuit from San Francisco to New York, 4,600 miles, the distance from New York to London, via Canso, N. S., being 3,500, or 8,100 miles in all. The telegraph lines making up this circuit ran from San Francisco to New York, via Vancouver, B. C., Montreal and Albany, connecting at New York with the Mackay-Bennett Postal Cable Company. Telegrams exchanged between San Francisco and London were therefore only repeated at New York, Canso, and Bristol, England, the latter point being the landing place of the Mackay-Bennett cable. The object of this experiment was to demonstrate the fact that London and Vancouver were practically within "speaking distance" of each other. These unbroken lines demonstrate the fact that their system can be successfully maintained during the most rigorous season of the year.

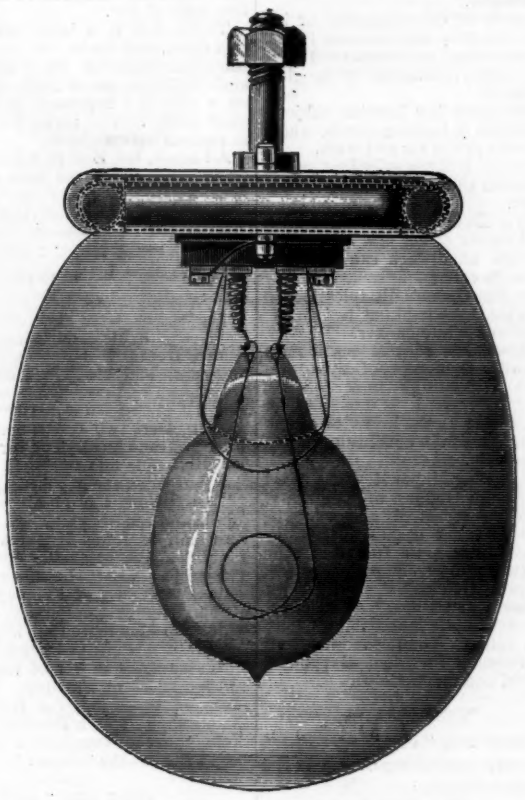
At 1.12 P. M. Mr. Norman, at Vancouver, asked Mr. Stead, at London, a question, receiving a reply in five minutes. Mr. Stead then asked, "How far off are you from London?" In four minutes reply flashed back, "Nine thousand six hundred miles," which, with the 1,200 miles to San Francisco added, makes a grand total of 10,800 miles. Conversation was kept up for two hours. Mr. Norman said, among other things, "I can see the Pacific, and in a few days start on a 4,000-miles voyage in another English ship, 'The Parthia,' over another ocean; yet I am able to report myself to you and talk as quickly and easily as if we were speaking through a tube. The wire which unites us is a most striking symbol of our imperial unity, and of the unfailing federation which will one day girdle the globe. Is not the click of this key—heard in two hemispheres—more eloquent than all the arguments of empire ever penned?"

The Electric Railway at Richmond, Va.

Ten of the electric cars were put on the line yesterday morning, and they ran with much regularity during the day, although the track was in bad condition. The motor men, Superintendent Burt says, are becoming quite well drilled, and if the trials for the next two days are as satisfactory, the line will be opened to the public Thursday morning with a regular schedule. No passengers are yet taken; that is, those who are allowed to ride on the cars do not pay their fare. In a few days, however, the conductors will be glad to welcome the public.

These cars will certainly present a novel as well as attractive sight at night, when they are propelled, lighted and heated all by electricity.

A very satisfactory test was made yesterday with Dr. W. Leigh Burton's electric heaters on car No. 29. This was the first time a street car was ever heated by electricity anywhere. The heaters were connected



STORM-PROOF FITTING FOR INCANDESCENT LAMP.

in series, having a resistance of 198 ohms, and carrying a current of two amperes—equivalent to a fraction over one horse power of energy—obtained from the overhead wire. The heaters were placed under the seats, and by means of reflectors the heat was thrown into the body of the car, causing a comfortable temperature.

With the success of this test the Union company propose in a short while to apply these heaters on all their winter cars, which would then be propelled, lighted and heated by electricity.—*Dispatch, Jan.* 31.

Osculatory Electricity.

The electric kiss is given by approaching the unsuspecting victim, shuffling the slippered feet softly over the carpet, and bending the head well forward, so that the lips shall be the part of the person furthest advanced. Just as the lips have almost touched the face of the victim there is a crackle and a sudden and stimulating shock, which those who have tried it describe as very pleasant. If the room be darkened the spark can be distinctly seen by a third person. It is said, however, that the experiment is usually more successful when the third person is somewhere else.

Here at last is a field suited to the tastes of our girls: something to do besides reading novels and masticating bon-bons. There is a whole dictionary to be gotten up descriptive of the various conditions under which this new electric kiss can be accomplished, and the various effects produced. Care should be taken, however. Let the girl beware of experimenting with the fellow who has been "seeing the boys"; for he has a dynamite breath, and the tiny spark from slippered feet is as potent as Zalinski's fuse. Let them look out for the onion fiend, for, though not inflammable, it is yet mighty enough to absorb the spark, revivify it, and send it back with quadrupled activity and odoriferous potential.

Girls with lovely aquiline noses, also beware how you pose for the experiment, and see that the fellow has a *nez retroussée*, or there may be a premature explosion. The best object to practice on is a tried and experienced reporter; the years of exposure to the strings and arrows of journalistic fortune have indurated not only his celebrated cheeks, but his eyes, nose and lips, and he can painlessly endure any amount of the new treatment, especially if the experimenter be a pretty girl. If modesty did not forbid, we could suggest a trained and highly successful subject, in the new style of *seance*.

—— The Kinsley, Kansas, Street Railway and Electric Light Company has been organized, with a capital stock of $100,000. The railway line will be four miles long. The Thomson-Houston system of electric lights is being established in this city also.

A New Departure in Brazing and Welding.

Mr. Fletcher, the well-known gas engineer, writes as follows: "The cheapening of oxygen by Brin's process of manufacture has put into the hands of metal workers a new power. I have recently made a few experiments with the compressed oxygen and coal gas, and found that with a ½ in. gas supply a joint could be brazed in a 2 in. wrought-iron pipe in about one minute, the heat being very short, the redness not extending over 1 in. on each side of the joint. The appearance of the surface after brazing led me to experiment further with welding, a process which is not possible with ordinary coal gas and air, owing to the formation of magnetic oxide on the surfaces. Contrary to my expectation, a good weld was obtained on an iron wire ¼ in. diameter with a very small blowpipe, having an air jet about 1/32 in. diameter. This matter requires to be taken up and tried on a large scale for such work as welding boiler plates, which, it appears to me, can be done perfectly with far less trouble than would be required to braze an ordinary joint. The great advantage of this would be that the boilers would require no handling, but could be welded with an ordinary large blowpipe in position, and with about one-tenth the labor at present necessary. The cost of the oxygen is trifling, and it is evident from the results obtained in brazing that the consumption of gas would be considerably less than one-fourth that necessary with an air blast, irrespective of the fact that welding is possible with an oxygen blast, whereas it is not possible if air is used. The surface of iron heated to welding heat by this means comes out singularly clean and free from scale, and a small bottle of compressed oxygen, with a blowpipe and a moderate gas supply, would make the repairs of machinery, boilers, brewing coppers and other unwieldly apparatus a very simple matter. The trouble and difficulty of making good boiler crowns, which so frequently come down, would be very small indeed when the workman has an unlimited source of heat at command, under perfect and instant control."

Incandescent Lamp Fittings.

We are indebted to our London namesake for the following:

The accompanying illustration shows clearly the construction of the storm-proof fitting for incandenscent lamps, designed by Messrs. Sudworth and Falkenstein, which we mentioned last week in reference to the lighting of the British Xylonite Company's factories in Manningtree. The circular base is of xylonite or any other suitable material, holding the lamp and lamp holder, over which is fitted the glass globe, hermetically sealed by the india-rubber ring. The globe may be taken away by a pressure of the hand on one side of the ring, and as easily replaced. Altogether the apparatus is very simple and should meet with a considerable application.

*** The decision by the Supreme Court in the telephone case is expected by Feb. 20th. It is reported that the decision will leave no ground for complaint by either side as to the beliefs and meaning of the court on the questions at issue.

ELECTRIC CLUB MEMORIES.

What the Press of New York Thought of the New Club House.

CLUB NOTES.

H. D. Lyman is put forward as the club's champion billiard player.

The only dissatisfied electric men are those who had not joined the club.

The reception committee deserves high praise for its excellent management.

Col. Geo. L. Beetle's absence in the sunny South was regretted by his many friends.

A courteous letter of regret was received from Prof. A. Graham Bell, too late to be read at the opening.

Commodore Chas. A. Cheever was as ubiquitous and cheery as ever, and is willing to attend such a glorious opening every week.

Dr. Otto A. Moses ran over from London to attend the opening, and Geo. S. Ladd came on from San Francisco, and neither regretted it.

Messrs. Baker, Dutton and Reed, of the house committee, were to be seen everywhere, ever watchful for the comfort of the hundreds present.

The Philadelphia and Boston members were present in full force, and have ever been loyal workers for the advancement of the club's best interests.

Chas. Selden says that the *Sun* reporter who spoke of the "comparatively cool electric fluid" was badly off, and he knows, for he has tasted all kinds.

Major J. M. Brown doesn't mind the trip to New York from Washington, now that he is sure of greeting some of his good friends at the club whenever he comes over.

Mr. George M. Phelps, jr., received a hearty vote of thanks and three cheers and a tiger for the very acceptable and obliging manner with which he presided at the piano.

Mr. C. F. Johnson was the stenographer of the opening, and did his work thoroughly. Through his excellent work, full reports of the many impromptu speeches were secured.

Chairman Goodyear, of the House Committee, never released his grasp of the entire situation until the last guest had departed. With a consciousness of a difficult work well done he then went home.

The $2,500 painting, presented the club by Theo. N. Vail, has, very properly, been given the place of honor in the parlor. It was greatly admired by all on the opening night. The talented artist is Elizabeth Strong.

The very elegant solid silver punch bowl, with its appropriate electric motto, presented the club by Captain H. R. Garden, was greatly admired by all who saw it. Its contents the opening night were not neglected.

The portraits published in the REVIEW last week—unlike such illustrations generally—have met with the most pleasant commendation. We think it but justice to acknowledge our indebtedness to the REVIEW's careful artists, Messrs. Stevens & Morris, of this city.

A check to go towards defraying "expenses in fitting up the new Electric Club House," was handed the president the night of the opening by D. L. Hungerford, of the Benedict & Burnham Wire Manufacturing Company, Waterbury. No bonds were asked, the money being presented as a gift.

Mr. J. C. Tomlinson was complimented on all sides for his very appropriate and earnest remarks, presenting President Davis with the handsome gold watch. It is one of the Geneva Non-Magnetic Watch Company's most elegant timepieces, and was suitably inscribed. A list of the names of the donors accompanied it.

Too much praise cannot be given Mr. Geo. B. Coggeshall, of the house committee. The heavy work of preparation for the opening fell to his lot, and we doubt if any one present fully appreciated the painstaking work he had gone through to secure the admirable results so evident in the smooth running of everything the night of the opening.

E. N. Dickerson, the widely-known telephone attorney, took great interest in the proceedings the night of the opening. "The electric light makes a wonderful improvement in social events," he remarked to a REVIEWITE. "Just notice that, notwithstanding the brilliant light and large crowd here to-night, every one is comfortable. If gas were the illuminant, we would all be unpleasantly warm and the air vitiated."

Mr. E. T. Gilliland's unique and valuable gift of a bronze statue of the "Goddess of Electricity" is one that the club highly appreciates. The model occupied the elegant solid mahogany pedestal (also by Mr. Gilliland), on the night of the opening and held aloft a brilliant incandescent lamp in its right hand, while the left was apparently taking the electricity from the clouds that are massed around the feet of the beautiful goddess. It is the most striking ornamental feature of the club, and is a tribute to the ingenuity as well as the generosity of the popular donor.

THE POINTS MADE BY THE NEW YORK JOURNALISTS

FROM THE "HERALD."

The *Herald*, in its brilliant report, says:

Electricity is Queen!

Holding aloft a blazing torch of lightning, the Goddess of Electricity proudly exhibited her naked loveliness.

Over the heads of four hundred of her prophets and disciples she towered in her throne room, uncovered and unadorned, save by her natural beauty, enhanced by the glare of countless lights.

To the Fire Queen her humble subjects bowed, and listened to burning words, which rang her lightning praise far and wide.

Her throne room is the resplendent parlor of the new Electric Club, No. 17 East Twenty-second street.

The Goddess of Electricity has smiled upon every hole and corner of her new home, and traces of her deft handiwork can be found from its roof to its cellar.

Of course the Fire Queen's disciples flocked from far and wide, to worship at her shrine in clawhammer and white choker.

Professor Rowland's address was a most complete scientific synopsis of a subject which he could only outline in several columns of the *Herald;* so it is impossible to touch upon it, owing to the limits of space; but a few remarks made in conclusion should be read with interest.

Later in the evening Mayor Hewitt entered the presence of the Goddess of Electricity, and was loudly and repeatedly cheered. The club members insisting upon a speech, the Mayor gracefully came to the front and made one of his always most happy addresses, which was repeatedly cheered, and greeted with "three cheers and a tiger" at the close.

Other orators broke a lance for the fiery goddess. Mr. John C. Tomlinson, on behalf of the club, presented President Davis with a handsome gold non-magnetic watch.

FROM THE "SUN."

Out of the very interesting report in the *Sun* we take the following:

Gentlemen in claw-hammer coats crowded to the reception, and enjoyed a good many things, besides the bountiful hospitality of the scientific men who were the hosts of the evening. When the bell boys had taken their hats and coats, they were escorted by the scientific hosts to the third floor, and warmed their feet upon a long, flat sheet of iron set in the fireplace, and which shed a genial glow of heat through the room. It was a new-fangled electric heater, and the same current that furnished light for the electric bracket burners on the wall threw as much heat into the iron plate as the hosts wanted there.

From the novel foot-warmers the guests journeyed to the basement, where their boots were blackened for them by electricity. A porter rubbed some polish on their boots, turned a knob in a machine that looked like a fire extinguisher on its side, and with a revolving brush fitted at the end of a rubber hose. The instant the knob was turned the brush began to revolve so swiftly that the eye couldn't detect its motion, and by simply pressing it lightly against the surface of the boot a fine polish was quickly produced. Looking through the door of the billiard room, the guests saw, while they were getting an electric shine, a handsome marble clock, ticking away upon the mantel. It was made expressly for the club, and will run a whole year. Behind the works is a little storage battery that supplies a current that winds the machinery up automatically, whenever it runs down. The battery has power enough stored away in its jar to wind things up every day in 1888.

The safe in which all the club receipts are kept was on exhibition on the ground floor, when the guests got there again. The safe locks and unlocks itself by electricity, too, and a blind man or a man in the dark can unlock it as easily as a man who has the use of his eyes.

FROM THE "PRESS."

Under the heading of "In a Modern Fairyland," the *Press* says:

Electricity was king last night at 17 East Twenty-second street, where his subjects, the members of the Electric Club, have built a most gorgeous throne for him. The club is young—only a year old—yet last evening it threw open its magnificent home, with a membership of over four hundred electricians and gentlemen engaged in allied branches. Furnished throughout with exquisite taste, the club house is a monument to the possibilities of electricity.

As you ascend the wide steps leading to the vestibule you are bathed in a soft, mellow flood of electric light, which is reflected again and again from the ground glass in the door leading to the wide hallway. Before reaching the top step the controlling spirit of the establishment hastens to your service—electricity opens the door for you. A second electric contact point on one of the steps manipulates an unseen hand which turns the handle of the hall door noiselessly. The great hallway fairly blazes with electric radiance cast from a hundred incandescent lamps inclosed in beautiful cut glass globes. From the ceiling hangs a fantastic chandelier or electrolier, as it becomes in this electric fairy land. Dozens of arms shoot out from the brass stem with encased lights at the ends like balls of fire.

To the left is a large parlor and reception room, and there the Goddess of Electricity, a beautiful nude maiden, holding aloft a glowing arc of light, stands enthroned on a beautiful rosewood pedestal before a great mirror. The parlor is richly furnished in maroon velvet plush.

All in all, the Electric Club is a wonderful institution, and the three or four hundred persons who attended the housewarming last night were fully convinced of this.

FROM THE "TRIBUNE."

The *Tribune*, in its comprehensive account, says:

The rooms were brilliantly illuminated by electric lights, gas being rigorously excluded from the building. The rooms are numerous and spacious, and the club congratulates itself on having secured quarters which it can regard as permanent.

There were two feasts, one oratorical, the other gastronomical. The former was served because, while ministering to the intellect, it also sharpened the physical appetite.

Then followed a highly scientific, philosophic and erudite paper by Prof. Henry A. Rowland, of Johns Hopkins University, to which only a magazine could do justice. The subject was "The Electrical and Magnetic Discoveries of Faraday." Here is one of his tributes to Faraday: "The spark which Faraday more than fifty years ago observed in a darkened room now blazes out with almost the power of the sun, but it is still the spark of Faraday. Though it is a thousand times as large, it is still made on the principles which Faraday laid down, and nothing except mechanical details has ever been added to the process."

FROM THE "WORLD."

In the *Daily World* appeared, among other things, the following:

The Electric Club, a society whose members are all famous electricians, had a housewarming at its new and magnificent club room, at No. 17 East Twenty-second street, last evening. The attendance numbered fully 400, including club members and invited guests. Henry C. Davis, the president, Chas. W. Price, secretary, and Lieut. Toppan, U. S. N., retired, Frank G. Stone, M. W. Goodyear, of the Reception Committee, used their utmost endeavors in making the visitors believe they were in a realm where one obtained what one desired before asking. The address of welcome was delivered by President Davis, who during the evening was presented with a very handsome gold watch. Prof. H. A. Rowland, of Johns Hopkins University, of Baltimore, delivered a lecture on "The Electrical and Magnetic Discoveries of Faraday."

FROM THE "MAIL AND EXPRESS."

The following notes are from the editorial columns of the *Mail and Express*, the editor of which paper, Major J. M. Bundy, takes quite an interest in electrical progress:

The new "Electric Club" sets out with a membership admirably calculated to insure for it a brilliant and prosperous future. Unlike too many of our clubs, it is an organization that appeals to the brains, and not to the stomachs, of its members.

Mr. Hewitt, at the Electric Club reception, said "he had hoped that the electricians would invent something to save him the trouble of writing letters." It would be a pity if they did, because this would deprive us of many piquant epistles and some substantial moral and intellectual satisfaction. But the politicians are of opinion that the Mayor might be saved the trouble of writing some of his letters by a more complete preliminary examination of the subject.

One of the great advances made by electricity, as shown at the inauguration of the Electric Club, is a safe, that can be unlocked by a blind man as well as by any other, and in the dark, consequently, as well as in the light. This has, for a long time, been a great desideratum in the select circles of burglardom; and it must be pleasant to the philanthropic mind to find that even the burglar is not overlooked in the march of science. Let him study electricity.

FROM THE "DAILY GRAPHIC."

The *Graphic* presented a number of illustrations of the rooms and furniture of the Electric Club, as well as the portraits of several of the officials. In its account of the opening, the following notes appear:

Dr. Benjamin, slim and blonde, with a bulging forehead, found friends at every point of contact. He is one of the most popular members of the club, and deserves to be.

Secretary C. W. Price was charged to the muzzle with good feeling. He was all over the building, and made himself useful wherever he touched. He was particularly enthusiastic over the divers electrical novelties.

W. S. Hine was on the reception committee and did his duty there. He has been one of the sturdiest workers for the club's welfare, and nobody knows how hard he has worked to bring about the present flattering results. He took care of everybody, although he never meets anybody to take care of him.

Henry Hine is on the committee of membership, and he kept his eye upon the numerous guests of the occasion, who were so charmed with the prospect that they wanted themselves "put up" right away. The high character of the membership is not a little owing to Mr. Hine's tact and discrimination.

Professor Anthony, Professor Green and Professor George Forbes made an interesting group. They spent some time together, exchanging ideas that will shortly be further developed in the lecture room. They are all of them striking and intellectual looking men.

Treasurer A. J. Dam was a good deal there, and not at all surprised at his popularity. Mr. Dam is a large man with a considerable head, and his official position in the club is a deserved recognition of his fiduciary ability.

Lieut. F. W. Toppan, U. S. N., was on hand early. He is an accomplished electrician, and has taken much interest in the progress of the club. He is one of its most valuable workers, and is as good looking as he is useful. But, then, all the members are a well and brainy looking lot of men, and don't bring their commercial or professional rivalries along with them when they come into the club.

George W. Hebard is one of the vice presidents, and noted for his force of character and the prominence into which he has brought himself in the electrical interests of the country. He dropped in for a short time last night and was mightily cordially welcomed.

Dr. Moses was just back from Europe, and he told his friends with delight how far ahead of the Englishmen we were in electrical matters. He said parliamentary legislation abroad was giving American manufacturers the field there. The doctor's sanguine views were endorsed by many of the electricians who had been on the other side.

John B. Powell, another of the vice-presidents, is a man full of resources always, and he threw off any number of sparks in the way of suggestions for the club's increased usefulness. He is one of the strongest men in the club, and a very well liked one.

George B. Coggeshall, as a member of the house committee, is likely to spend considerable time there, and the more time he spends the better suited the members will be. He has very clear ideas as to club management, and particularly as to the sort of club this ought to be.

Editor George Worthington was the center of a group, no matter where he happened to stand. He has been prominent in the club since its organization, and very properly, for he is an authority in the electrical world.

FROM THE "TIMES."

The Electric Club threw open its doors last night, and entertained a large number of guests at its formal housewarming in its new club house, 17 East Twenty-second street.

Not only a comfortable home for members of the club was found by the invited guests, but many little electrical contrivances, novelties in their way, and yet useful, started up, unexpectedly often, to surprise them. The club house is a four-story brown-stone building, containing plenty of room for the requirements of the members.

The goddess of electricity stands on a pedestal at the head of the parlors, holding aloft an electric light of brilliance and beauty, which illuminates the goddess herself. She stands in front of a large mirror, and is the gift of E. T. Gilliland.

After inspecting the rooms, the guests assembled in the parlors, and were welcomed by President Davis. Then addresses were made by Prof. Rowland, of Johns Hopkins University, Mayor Hewitt and others. One of the pleasant surprises of the evening was the presentation to President Davis of a beautiful gold non-magnetic Swiss watch, given by a few of his friends.

FROM THE "COMMERCIAL-ADVERTISER."

We take the following from an editorial in the *Commercial-Advertiser*, and call special attention to the kindly and excellent counsel given in the last paragraph:

In a little book recently published, and called "A Century of Electricity," Professor Mendenhall recalls Benjamin Franklin's account of an "electrical pleasure party" given on the banks of the Schuylkill, at which in electrified bumpers toasts were drunk to the health of the great electricians of Franklin's day, while great guns — as great guns were thought of at that time— boomed forth scientific triumph, being fired from electric batteries of the famous old Leyden jars. From that day, with its primitive glorification, till now, when we have an Electric Club up in Twenty-second street open its doors to its guests as it did last night, with electricity polishing their boots with the celestial fire, warming them with the *theia hyle* and generally transforming the energy of the Promethean fire for work in utility, and ease, and pleasure—from that day to this is a longer time, measured by the old non-electrical standard, than it would be when measured by "Poor Richard's Almanac."

Metaphysicians tell us that time and space cannot even be imagined as annihilated, and then arise other metaphysicians who say that those persistent entities cannot be annihilated for the same reason that water, being already the ashes of hydrogen, cannot be burned—for time and space, they say, are already nihil. However this may be, there should seem to be little doubt that if time enough is given to Mr. Edison and his scientific brothers, they will soon do away with space as a thing worth taking into account, and if space enough be given them for laboratories and club rooms, they will find even their three-hundred-and-sixty-five-day electrical clock of not much service, for time will be no more.

We have a little piece of advice for the Electric Club. Incidental to club life there is a certain wonderful hydro-carbon, of a highly exhilarating character, and of a name Arabic in derivation, and coming down to us from alchemists, and from Saracens, upon whose mosques, amid tall minarets, stands the old alembic shaped like what may be a crucible or a demijohn, according to the eyes that gaze upon it when into St. Sophia's the Turkman gets. It is highly electrical, and should be handled only with insulating gloves. Its qualities, we believe, depend largely for their value upon the arrangement of the molecules within it, and doubtless this arrangement will be disturbed by a force which is so powerful that it can stop a clock, wherefore the club last night gave its president a non-magnetic watch. The members should watch with painful anxiety the effect of the close proximity of dynamos and batteries and Ruhmkorf coils upon the intermolecular disposition of this alchemic product. Possibly it will heighten its effects upon the human body; possibly it will lower them. It is not for laymen to prejudge the matter, but the electricians should carefully investigate it before sending learned papers on the subject to *Science* or to *Nature*. It will not do for them to go off at half cocktail.

The New "Hub" Bell.

This new iron bell, manufactured by the Electric Gas Lighting Co., of Boston, is illustrated on this page. The bell works finely on any reasonable length of circuit, with minimum battery current, and is very simple in construction and works easily. It is novel in design, and suitable for the best houses. The working parts are held in place by a lockspring and screws set up by check-nuts, both inside and outside of the shell, so that the contact points will not become disarranged, or jarred out of adjustment.

The Industrial Importance of Electricity.

The subject chosen by the president of the Society of Telegraph Engineers and Electricians for his inaugural address cannot fail to be highly interesting not only to engineers and electricians, but also to manufacturers of machinery and apparatus required in the practical application of electricity. In this address an attempt has been made for the first time to express in figures the importance of the various trades depending upon the operation of electricity in one form or another. It has often been said that the elaboration of a presidential address for any of our learned societies becomes more difficult from year to year as the available ground becomes to an increasing extent occupied by previous addresses, and considering the large number of able men who have preceded Mr. Graves in the presidential chair of the Society of Telegraph Engineers and Electricians, he had no easy task before him if he would tell the society something which would be both novel and of practical interest. He has, however, acquitted himself of the task in a manner which leaves nothing to be desired. His address dealt with a sub-

THE "HUB" BELL OF THE ELECTRIC GAS LIGHTING COMPANY.

ject which is novel, in the sense that nobody had previously taken the trouble to investigate it, and which at the same time is of the highest practical importance, because of affecting more or less directly the worldly prospects of his hearers. The president's high official position made it possible for him to obtain information of the number of persons employed in various branches of applied electricity, both in the manufacture of electrical machinery and apparatus, and in the working of industrial enterprises based on the use of such machinery and apparatus. These figures he has now published, and the world is for the first time in a position to form at least an approximate estimate of the industrial importance of applied electricity.

The estimate refers, however, only to those persons who earn their living by the application of electricity in one manner or another, but it does not comprise the far greater number of persons who are indirectly benefited by this agency. If a manufacturer, a merchant, or a private individual sends a telegraphic message, he does so because he expects to derive some benefit from the more rapid means of communication as compared to the sending of a letter or a special messenger. This benefit in some cases cannot be expressed by a monetary standard, but in the majority of cases it is simply a financial benefit, measurable in £. s. d. By use of the telegraph, orders are more promptly executed, time is saved, supplies can be secured in the cheapest markets, and the cost of production reduced, whilst, on the other hand, the value of the manufactured article is enhanced by greater opportunity for effecting a sale which naturally follows the improved facility of communication with various consu Thus the operation of the telegraph tends to enhance the amount of wealth produced by human labor, and at the time when the Government took over the telegraphs in this country, it was roughly estimated that a sum of 10s. represented the commercial value of each telegraphic message. Since then, telegraphy has enormously expanded, and the commercial value of each message is probably considerably greater than was then estimated. With this aspect of the case, however, the president did not deal. He confined himself to enumerating the benefits accruing to the persons immediately engaged in electrical pursuits. In limiting his investigations to this branch of the subject, he had the advantage of being able to deal with it in a strictly scientific manner, omitting all guesswork and conjectures, and including only such facts as could absolutely be substantiated by figures. There can be little doubt that in his anxiety to present to the society only that which is absolutely reliable, he rather under than over-estimated the number of persons directly engaged in electrical pursuits; but the relative proportion between the different numbers of persons engaged in the different branches of electricity is probably correct. The following is a list given by Mr. Graves of persons employed in Great Britain. We have added to each item the percentage of the total, so that the relative importance of the various trades may become apparent:

Employed in connection with	Number of Persons.	Percentage of Total.
British Land Telegraphs	23,868	56.3
Submarine Cable Companies (mainly British).....	6,000	14.2
Telephone Companies.....	2,500	5.9
Electric Lighting.....	5,000	11.8
Cable Making and allied businesses.....	5,000	11.8
	42,368	100

Mr. Graves estimates that the total number of persons employed in land telegraphs throughout the whole world is 180,000; in telephones, 30,000, and in electric lighting, 100,000. Confining ourselves, however, only to the figures for Great Britain, we must remark that the total of 42,368 relates to persons whose whole time is occupied in electrical occupations, the figure being exclusive of those persons who occupy only part of their time in electrical work. On many railways, for instance, the men in the signal cabin have to transmit electrical signals, and occasionally whole telegraphic messages; but they have at the same time to attend to their signal levers and to the general working of the traffic. In various engineering works in England, which have added an electrical branch to their previous business, the time of many employes is divided between the manufacture of electrical apparatus and that of other machinery. These persons are not included in the returns, and Mr. Graves estimates that if it had been possible to collect data relating to all who are only partially occupied in electrical pursuits, the grand total of persons dependent for their employment on the various operations directly connected with electricity in these islands would amount to about 100,000, besides a very large addition to the numbers in various trades caused by the consumption of materials they produce. The employment of 100,000 persons means the support of at least 300,000. It is customary to reckon the average family maintained by industrial workers at 4½ to 5; but as in electrical work there is considerable preponderance of young and unmarried people, the average family has been taken as three per worker. On the same basis Mr. Graves estimates, that throughout the world there must be about five millions of people who would have to seek for other means of subsistence if electricity and its commercial applications had not been made known to man.

A scrutiny of the figures in the little table given above is very interesting. We find that 56.3 per cent. of the total number of persons deriving their subsistence from electrical occupations falls to the British land telegraphs. A material increase in this figure is not likely to occur in future, and it is rather probable that the percentage—if a similar return should be made in ten years' time—will be found lower. The reason is obvious. Telegraphy was the first practicable application of electricity, and has consequently had more time to be developed to its present high degree of perfection than other branches. The present net work of telegraph wires throughout these islands is practically complete, and a large accession of employes cannot be expected to result from the erection of the few new lines which are annually added to our telegraphs. An increase in the number employed might be looked for as a consequence of the more and more extended use of the telegraphs by the public; but the increase will not be very great, since improvements in apparatus are continually being made, whereby the speed of telegraphy and the work done by each operator on each wire are increased. In submarine cables there is for similar reasons no probability of a large increase in the number of persons employed; but when we come to the telephone, electric lighting, and to cable making, it seems highly probable that the absolute numbers as well as the percentage numbers, of the above table will for some time to come continually increase. The telephone is not as yet used to anything like the extent commensurate with its great utility; and there can be little doubt, that as soon as legal restrictions are removed by the lapsing of the various patents, an enormous expansion of telephone business will be the result. In electric lighting an expansion of business is also imminent. Patent rights and monopolies have in this case not had the same baneful influence as in telephones, but legal restrictions of another kind have hitherto hampered the general supply of electricity for lighting purposes; whilst the over-speculation in electric light shares some six years ago has had the effect of deterring many from embarking money in this business. Hence the comparatively low number of persons engaged in electric lighting. The condition of this industry is, however, now on the point of a radical and salutary change, and we have little hesitation in predicting that by the end of the current year a fair number of central stations for the supply of electricity will be established throughout England. That the Electric Lighting Act of 1882 must be amended, is admitted on all sides, and unless the time of Parliament is blocked by urgent political legislation, the coming session will probably see a new Electric Lighting Act, under which it will be possible for contractors to work, and which will secure capitalists a fair return for their investments. Meanwhile, electrical engineers have not been idle, but have improved the methods of generating currents and the various systems of distribution over long distances to a degree which will render the introduction of a public supply of electricity technically safe and commercially profitable. In estimating the possible increase in the number of persons employed in electric lighting, it must not be forgotten that the figures in the table include also those persons who are now engaged in the manufacture of electromotors and apparatus required for applications of electricity other than lighting. These applications at present form an insignificant part as compared with the lighting industry, but they cannot fail to develop largely within the next few years. As all these trades are dependent upon the production of cable makers, the latter will also find their business expand to a very large degree. —*Industries.*

Electro-plating with the Dynamo.

A paper on this subject was lately read before the Electro-Technical Society of Vienna, by Wilhelm Penkert. After an historical sketch of the subject, from the first attempt in 1875, at the Austrian State Printing Office, to the present day, the author gives some interesting hints from modern practice. For smaller baths, earthenware, free from acid, is found the best; for larger sizes, wooden baths, lined with lead, which in its turn is covered with large glass plates, may be used, as the resin on the lead is found to have a bad effect on the deposit. The experiments carried out by Baron Hubl, at the Military Geographical Institute, were mentioned as showing that, with a current density of 1.3 ampere per square decimeter (=.084 ampere per square inch), in a bath of 20 per cent. solution of copper sulphate, with 3 per cent. sulphuric acid added, a deposit is obtained which is tougher than rolled and hammered copper, and almost as elastic, strong and hard. Baron Hubl had also shown that the anode used is not composed of copper oxide, as formerly supposed, but of pure metallic copper.

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It is gratifying to note the recent progress of storage batteries in this country, which has been the last to yield from a position of skepticism. The various experimenters have steadfastly plodded along, however, and now it really seems as if the storage battery had come to stay. Upon a careful review of the past, in the light of present knowledge, it seems that a great many of the past failures of batteries to stand up to their duty have been caused by want of knowledge as to the proper treatment of them, the safe current-limit in charging and discharging. At the present day the storage battery is as reliable as any other form of battery, and has one great advantage, that, once properly set up and started, and thereafter treated as it should be, a well made accumulator should last almost indefinitely. Most of the troubles of the past have been due, not to ignorance of how to make the cells, but to a want of knowledge of how to charge and discharge them, causing sulphating, displacement of the plugs, and buckling of the plates, all of which, through the inexperience of the inventors, have seemed fatal and insurmountable objections. To-day, however, their causes are well understood and easily prevented, and the storage battery is fast growing into one of the powerful tentacles of electrical science, and will reach thousands of uses and adaptations perhaps as yet unthought of.

And now for the Electric Light Convention.

Reduced rates from the East and West have been secured for delegates to the Electric Light Convention in Pittsburgh, Feb. 21st. There are a great many live questions in the branches of light and power, and a very interesting meeting may be expected.

Mayor Hewitt was so well pleased with what he saw at the Electric Club the opening night that he visited the club the next day, and spent a couple of hours in looking through it. His admirable little speech has won him many friends among the electrical people, who are one and all pleased to be classed as "the couriers of the coming millennium."

A MISCONCEPTION BY AN ESTEEMED DAILY CONTEMPORARY.

At the inauguration of the Electric Club there were pleasant surprises which made the occasion gay for the invited guests, and gave an illustration of the various small uses to which this greatest of earthly forces may be trained. It is, however, we suppose, rather curious than important to note that the lightning may be made to work a boot-blacking machine. These are the jokes of science, and, we hope, not a measure of the conceptions the electricians have of what is to be done in the world by the great power that they are harnessing and training * * * * Boots can be blackened well enough by the boys in the streets. Electricity is not necessary for this, and we hope the Electric Club may help in the formation of that opinion, which will enlarge the sphere of its activities in doing things beyond the powers of mortals without its help.—*Mail and Express.*

The Electric Club is not specifically a training school, nor a laboratory, neither is it an inventors' nursery. Its purpose and scope are broader and more comprehensive of the mutual, social, scientific and commercial interests of its members. But the foregoing extract betrays almost invincible ignorance of the history of electricity as applied to the needs of man. Are we to consider the instantaneous flashing of news from hemisphere to hemisphere nothing beyond the ordinary "powers of mortals"? Has electricity no hand in enabling the editor of the *Mail and Express* to treat its readers this evening to the proceedings of Congress at this morning's session? Does the electric current help him any in telephoning intelligence and orders daily? Does the mild radiance of the electric lamp render his labors lighter during these dark days? Were these things always within the "powers of mortals"? Electricity does not need the help of the ELECTRIC CLUB "in the formation of that opinion which will enlarge the sphere of its activities." Such an opinion has long since been formed, and its truth and stability demonstrated beyond question in the mind of every man informed about the doings of the world. Electricity is not going to be, but is now the great lever of the world, and is incessantly at work doing things far beyond the "powers of mortals;" and it will continue to grow in strength, might and magnificence, constantly doing good for man and beast, and there will never come a time when *nil admirari* can be said of the potent current. It will always be the source of newer wonders to the minds of men—and the Electric Club its most conspicuous shrine.

THE ELECTRIC LIGHT CONVENTION.

The forthcoming meeting of the National Electric Light Association at Pittsburgh promises to be an occasion of great interest to those in attendance, by reason both of the value of the papers to be read and discussed at the sessions, and also for the opportunities afforded for the interchange of experience and opinions during the excursions and personal interviews outside of the meetings.

On the verge of a meeting like this, one is naturally inclined to retrospection, recalling the organization of this association three years ago, and reflecting upon the measure of the work which it has accomplished, and the range of its influence.

Organized out of elements which did not extend up to the realms of science, nor down to the practical hard-pan of business, the electric lighting interests were dissonant, if not actually discordant, through lack of the unifying influence since furnished by this association, giving all opportunities of comparison and learning of features of merit in others.

The range of subjects presented and discussed at the various conventions include the most prominent features of electric lighting in regard to the problems of their practical application, giving a wide range of information which is not in the books, nor within the experience of any one man, or any score of men.

These topics treat upon dynamos and motors, the problems of steam and power, aerial and underground wires, the administration and finance of lighting companies, the construction and insurance of such property, and, in fact, it may be said that there is not a live issue relative to electric illumination which has not received some degree of attention at these meetings, by persons holding opposite views.

In considering the work of such a valuable organization, one calls up the sententious remark of Madame Recamier:

It is not what we are, or what we do, but what we can be, and what we might do, that is the true measure of our strength and duty.

Under the light and condition of contemporaneous circumstances, there is little to be said by way of desiring other courses in the past. The organization has been more than fortunate in the services of a president endowed with wisdom to plan and vigor to execute, realizing most fully the position which it will eventually attain, and the measures and time necessary to develop the material at hand into the form which must ultimately be reached by the organization as the representative of the electric lighting interests.

We are far from desiring to tinker and change the constitution, believing that many a worthy organization has been strangled by its own by-laws, but there are matters in which the experience of the engineering and scientific societies can be considered with advantage.

It is not in any terms of disparagement, or even the mildest criticism of any of the able and efficient secretaries, that we hold that the secretaryship ought to be a reasonably permanent position, when a person well adapted for such work is placed in that office, and should be entrusted with the numerous details which render the position so important to the welfare of the meetings.

It has been said in criticism of the meetings, that the discussions do not equal the character of the papers, as being discursive and frequently redundant of what has already been said. This is, to some degree, true, as it is of all bodies where papers are read for discussion.

It is the debate which brings out the true value of a paper by the weight of opinions for and against the views set forth; and any change in methods should develop, and not repress, free discussion.

Many of the English, and some of the American societies, require that papers be offered in time before the meeting for printing in pamphlet or galley form, and sent in advance to such of the members who request them for purposes of discussion. Such advance papers contain a notice requesting the press to defer their publication until after they are read. This plan allows due preparation in marshaling facts by those entering the discussion, a speaker cannot be misunderstood, and the press have every facility to make intelligent abstracts for subsequent publication.

There are other matters relative to evening sessions, and perhaps the most judicious method of regulating exhibits of electrical apparatus, which form such a valuable feature of the meetings, which pertain to the duties of the executive committee rather than the general action of a convention.

The National Electric Light Association occupies a field of its own, which cannot be shared by any of the engineering or scientific societies, and we do not believe that any electric lighting companies, or other parties engaged in matters pertaining to the practical application of electricity to illumination, or to the transmission of power, can reasonably afford to neglect to avail themselves of the opportunity for membership.

OUR CHICAGO LETTER.

(From a Special Correspondent of the ELECTRICAL REVIEW.)

General John L. Thompson, of the law firm of Williams & Thompson, died of paralysis on the 31st of January, after an illness of only three days. General Thompson has long been connected with electrical enterprises, and very generally, too, commencing with the Western Union Telegraph Company, being, in connection with his partner, Norman Williams, attorney for that corporation. In addition to this, the General was a director in the Arc Light and Power Company, the Chicago Telephone Company, and the Central Union Company, and interested as a stockholder in the Western Electric Company. Only a week previous to his demise he was elected to the honored and dignified position of president of the Union League Club of Chicago, a distinction to which few of its members would dare aspire. Had he lived another day General Thompson would have entered upon the fifty-fourth year of his life. The funeral attendance was large. The floral offerings were as beautiful as nature and art could produce, and evidenced the earnest sorrow felt at the loss of a valued friend and companion, as well as genuine sympathy with the bereaved family. Among those present were officers and members of the Union League, to the number of over sixty, the Bar Association, the Loyal Legion, Dartmouth Alumni, Telegraph and Telephone Companies, and the Western Electric Company, besides personal friends and relatives of the family. The sentiment is universal, that a good man has been taken away.

The Western Electric Benevolent Association held its first grand masquerade at Klare's Hall, on the 3d inst. The association, as its name indicates, is composed principally, if not wholly, of employes of the W. E. Company, and numbers a hundred and twenty or thirty members. Some two hundred were present at the ball, and the display of rich, comical, odd, artistic and grotesque costumes and actors such as no one ever saw outside a bal masque. There were, as Byron puts it

"Men of all ages, Turks and Jews,
Greeks, Romans, Yankee-Doodles, and Hindoos."

Of course everybody, hidden behind his own disguise, endeavored to pry into the incognito of his neighbor, and it is a source of self-gratulation to the subscriber that no one came within four rows of apple trees at penetrating his disguise. To say that the ball was a perfect and unqualified success is drawing it very mild.

The Chicago Arc Light and Power Company has made a scale of prices for motor power rentals, based on $100 per horse power per annum. Kittredge & Friott, whose printing establishment is in the same building as the electric company, are first to place a motor, and this is so hedged in with instructions, cautions and threats, as well as boxing, that the average electrical monkey will be quite likely to let it alone. It is a Baxter, of one horse power, and runs the

presses of the establishment. In case of anything going wrong the motor will be shut down till the proper party with the key can be summoned from down stairs to do the adjusting or make repairs. Funerals in Chicago come high, and the citizens prefer to use their money in some more profitable and business-like way than buying undertakers' wares, unless quite necessary.

While there is in the public library here, a good collection of recent electrical works, and the number is constantly increasing, the demand for this class of reading is such that it is almost impossible to obtain a volume, even for reference. A gentleman who has found it impossible to obtain this species of reading otherwise, concluded to have a little library of his own, and is as happy as a squaw baby with a red rag, over a lot of twenty-seven volumes just received from the REVIEW publication department, taken from its catalogue. The selection is an excellent one, and, but for the fact that electrical books are not made to lend, the name of the enterprising student might fill out this paragraph.

There was at one time in Detroit a newspaper artist, who made several pictures—from life—of members of the Electric Light Association, and came very near being prosecuted for damages. DeCamp had a bad turn shortly after, and Weeks was in bed the next night before ten o'clock. Judging from similar endeavors in the New York *Daily World* the 31st ultimo, the artist has moved East. Had these sketches been delayed twenty-four hours there is no knowing what they would have looked like—provided always that the artist had attended the grand opening. C. C. H.

CHICAGO, Feb. 4, 1888.

In Philadelphia last week an electrical contrivance for printing by telegraphy was exhibited at the office of the International Printing Telegraph Company at 417 Walnut street. It was directed by the inventor of the contrivance, Mr. J. H. Winville. The machine is a combination of a typewriter and an ordinary telegraphic instrument, by means of which the operator, pressing the keys on the board of a typewriter at one end of a telegraph wire, may make a typewriter copy at the other end of the wire. The transmitting machine also makes a copy of the message. The same machine can be made a transmitter. At the exhibition both transmitting and receiving instruments were in the company's office in Philadelphia, but the message was said to go out to Pottsville and thence back to Philadelphia by a loop in the telegraph wire. Several pages of matter were printed. Superintendent Ferris, of the company, told a reporter that while the idea of the machine was not a new one, the trouble had always been among inventors to get up a contrivance in a compact, uncomplicated, and inexpensive form, that would stand practical tests. "We believe we have such an instrument now," said Mr. Ferris. "We intend that it shall take the place of the telephone for use among business men. Unlike the brokers' 'ticker,' it prints upon a broad sheet. Its messages are absolutely secret, as the sending operator can cut all the instruments out of the circuit, except the one upon which he desires to record the message. The receiving machine works automatically. Anybody who can work a typewriter can send a message. The instruments are not liable to get out of order."

The Board of Directors of the Electric Light Company, San Francisco, has decided to recommend to the stockholders that shares of the value of $20 each be issued. By this plan it is believed that many citizens who favor the project will be induced to subscribe stock when they are unwilling to do this at the old valuation.

The assumption that every patent issued for something that does not prove financially successful represents sheer waste of money and effort is erroneous. In many instances a mechanic does his first persistent mechanical thinking in the direction of something that he patents, and though he may get no return in dollars and cents for his efforts, the start he gets in the direction of using his brains to some purpose may pay the cost many times over.

OUR BOSTON LETTER.

(From a special correspondent of the ELECTRICAL REVIEW.)

The daily papers are announcing with unanimity that the project of electric street cars has been given up by the great West End company, and that the cable system will be adopted. Still we learn that the work on the electric cars at the Cambridge shops of the company is being carried right along and that President Whitney says the papers sometimes know more about such things than the company. Time will tell. By the way, Col. Hewins has the first fare ever collected on a Boston electric street car. It is a shining nickel, and Mr. J. T. Moriarty, of the Accumulator Co., has the distinction of being the first paying passenger.

Arrangements have been made for the next dinner of the Electric Club, to be held at the Thorndike, on Saturday, the 18th, at 6.30 P. M. The paper of the evening will be by Mr. A. V. Abbott, of Brooklyn bridge fame, who will explain the plant of the Boston Heating Company. Mr. Abbott is now the engineer of the National Heating Company, of New York.

There is considerable hard feeling between the selectmen of Medford and the Electric Light Company of Malden. In an interview with A. E. Bliss, superintendent of the Electric Light Company, he stated that, at a town meeting, recently held in Medford, the town voted to instruct the selectmen to establish fifteen electric lights in various sections of the town, to be used until June 1st, and appropriated $300 for that purpose. The company finished the running of the wires on Wednesday, and started up eleven of the lights that night, and were to have the other four in [illegible] hursday. It is thought the selectmen will refuse to pay for the lights.

The Dover Electric Light Company completed its organization on Wednesday by electing the following officers: Directors, Thomas W. Pierce, Isaac F. Abbott, H. W. Burgett; president, Isaac F. Abbott; treasurer, H. W. Burgett; clerk, T. W. Pierce. The paid up capital is $75,000.

By invitation of the Long Distance Telephone Department of the American Tel. and Tel. Company, a number of the members of the Electric Club assembled at the company's office, Tuesday evening, and carried on conversations with various cities. A connection was made with the New York Electric Club's instrument, and members of these two organizations chatted pleasantly for some time. Among those present were, Mr. W. J. Denver, the vice-president of the club; Messrs. T. J. Moriarty, F. J. Boynton, A. H. Chapman, F. A. Houston, E. L. Caldwell, S. C. Peck, G. W. Davenport, and others. The American Bell Telephone Company, the New England Telephone and Telegraph Company, the Thomson-Houston Electric Light Company, and other electrical organizations, were represented.

The New England Wiring and Construction Company has made a contract to wire the new Hotel Gladstone at the Highlands.

Mr. Hollon C. Spaulding, an energetic member of the Thomson-Houston staff, addressed the Waltham Board of Trade on Wednesday evening, his subject being "Electric Motors." It is safe to assume, from this, that Waltham will soon have a motor circuit in full operation.

The general reply to inquiries for electrical men in this city, the past week, was, "Gone to New York, to the opening of the Electric Club rooms." Surely, Boston was well and ably represented.

It seems probable that a special car will go from Boston to the Pittsburgh Convention. Steps are being taken in that direction.

The underground steam heater plant of this city has a foundation which will sustain a building seven or eight stories high, but at present only the first floor is used.

The Thomson-Houston International Company has issued a new French catalogue from the Hamburgh office, which is a marvel for completeness. It is largely an extract from the "International Review of Electricity and its Applications." Mr. J. F. Meech is at the head of the Hamburgh office.

Mr. Hill, of 133 Oliver street, has a new line of cut-out boxes and double pole switches.

Mr. Frederick Kimball, the well-known experimenter and manufacturer, has removed to 103 Merrimac street.

The Stellar Electric Light Company, S. K. Bayley, manager, has removed from 91 State street to 13 Doane street.

A plant of 100 Thomson-Houston lights has just been installed at St. Stephen, N. B., in a large cotton manufactory.

The New England agency of Charles A. Schieren & Co. is supplying their special type of belting over an extended field in this and neighboring States.

Mr. Geo. W. Mansfield, whose place in the Thomson-Houston motor department office has been vacant several weeks, has been gaining rapidly during the past week or two, and will probably resume the management of his important department within a few days

President Francis A. Walker, of the Massachusetts Institute of Technology, in his annual report, has the following to say in regard to the course in electrical engineering:

"In the department of physics, including electrical engineering, the steady and healthy growth alluded to in my last report has continued without abatement. The laboratory and lecture courses already established have been extended, and a new course of lectures and exercises in the electrical testing of dynamo machines, by Mr. William L Puffer, one of the instructors in the department, has already been begun. A new course on electric motors will be given by Mr. Edward Blake, and one on the distribution of electricity, by Mr. Anthony C. White, both of whom were formerly students at the institute. The number of students in the course in electrical engineering is steadily increasing. It is hoped that, by the beginning of the next school year, the department will be able to offer to the public somewhat definitely laid-out graduate (commonly called post-graduate) courses, having a minimum duration of one and two years, and leading to advanced degrees in electrical engineering. There is little doubt that, if such courses are actually instituted, the facilities thus offered will speedily be made use of by our own graduates and by those of other institutions."

President Walker also feelingly alludes to the generous gift of Thomas A. Edison of the motor which now serves to supply incandescent lights throughout the college buildings. T. W. S.

Boston, Feb. 6, 1888.

OUR KANSAS CITY LETTER.

(From a special correspondent of the ELECTRICAL REVIEW.)

Superintendent Smith, of the United Telephone Company, says the increase in subscribers in this city for the year 1887, amounting to 630, was the largest increase for any year since the establishment of the telephone system here. The total number of subscribers now is over 2,300, and the exchange is fully equipped for 300 more. The average calls answered in one day is 28,708. One operator has answered 215 calls in one hour, and another operator has answered 47 calls in 10 minutes. Over 3,200 calls have been answered between the hours of nine and ten A. M. The company spent $40,000 in this city last year in the way of construction and reconstruction.

The Interstate Electric Company, of which Paul W. Bossart is general manager, is doing a large business in the way of furnishing storage batteries and incandescent light plants. The central station plant at Burton, Kansas, has had its second installment of batteries, and is now arranging for the third. The Fort Scott Railway machine shops in this city have a storage plant of 75 lights. The same system will probably be adopted in all the shops of that road. The great Nelson-Weller building, one of the largest and most imposing in the city, also has a storage plant. A storage plant of 250 lights will start up at Witwich & Penfield's, on Delaware street, in a few days. Beaham & Moffatt are arranging to put a storage plant in their spice mill, from which the Wabash and Western freight house and offices will also be supplied. The company uses the Edison lamp and apparatus, and Mr. Bossart says it gives general satisfaction.

The Lyons Electric Light and Power Co., of this city, has just started an arc plant. The company has also begun wiring for 600 incandescent lights, which is under the immediate control of C. E. Kemmeyer.

An electrical supply company, with a large capital, is to be established in St. Joseph at an early date.

The newly elected directors of the Kansas City Electric Light Company have chosen the following officers for the ensuing year: President, W. B. Grimes; vice-president, F. K. Hoover; treasurer, J. S. Chick; secretary, C. E. Barnhardt; general manager, E. R. Weeks.

The Kansas City Electric Light Company now operates two stations—one supplying electricity for 550 arc lights, and the other for 175 arc lights. They have power enough to operate 150 more arc lights. The company is also operating 1,500 incandescent lights. A 400-light plant of the Thomson-Houston system has just arrived, and will soon be placed in operation. The company is also doing quite a business in the way of electric motors, 20 of which, of the constant current type, are now employed. These are used for running lathes, drills, elevators, and in doing all sorts of work.

The Edison Electric Light Company has decided to increase its capital stock from $100,000 to $350,000. It will put in a $25,000 incandescent light plant, and adopt the underground system for its wires. Construction will begin as soon as the frost is out of the ground, and it is expected that the plant will be installed and 10,000 lamps will be burning before Sept. 1. G M.

Kansas City, Mo., Jan. 26.

Reduced Rates.

To the Editor of Electrical Review:

Please give due publicity to the following in your columns:

Mr. Geo. F. Porter, No. 1112 Arch street, Philadelphia, has arranged with all the trunk lines east of Pittsburgh, for a general rate of one and one-third fare for round trip from starting point for all persons attending the National Electric Light Association in Pittsburgh. Delegates will pay full fare to Pittsburgh, and a certificate will be issued to them by the secretary for a return ticket with the rebate.

All who desire attending the convention will please send their names at once to Mr. Porter, who will have the necessary certificates made out, and also state whether they desire sleeping car accommodations from New York on the special train on Sunday evening, February 19th.

Yours, very truly,
S. A. DUNCAN,
Chairman Executive Committee.
Pittsburgh, Pa., Feb. 3, 1888.

The Orient Illuminating Company has been organized at Portland, with a capital stock of $100,000, paid in, nothing; par value of shares, $50. President, Warren J. Robinson, Boston, Mass., treasurer, Hiram Blaisdell, Newton, Mass. Business to be prosecuted, manufacture of machines to be used in making and distributing gas, electric light, heat and power.

Mr. J. H. Miller, an electrician from the Chicago office of the Thomson-Houston Electric Light Company, is in Wichita superintending the construction of an electric light plant at Perkinsville. Machinery for the plant was shipped some months ago, and arrived in time to be destroyed when the Rock Island freight depot was burned. The duplicate of the machinery was immediately ordered, and arrived a few days ago.

The mills and factories in various sections of New England are going into electric lighting to a great extent. The Arlington Mills, of Lawrence, Mass., are now using about 450 lights, and it is said the management is contemplating a large addition to the present plant. The Washington Mills, another large corporation of Lawrence, is also using about 450 lights of the American system.

Telephonic News

⁂ Poughkeepsie, N. Y., is having some 75 foot telephone poles erected, to carry the long-distance wires through the city.

⁂ General Manager Geo. F. Durant, of the St. Louis Telephone Company, has been a New York visitor for a few days past.

⁂ The American Bell Telephone Co., through Patrick Bros., its attorneys, has filed suit in the United States Circuit Court against the Hutchinson Water, Light and Telephone Company for infringement of patent.

⁂ Messrs. Woodhouse & Rawson have lately introduced a new form of carbon for microphones, which is sufficiently hard to scratch glass, and is extremely homogeneous It is, moreover, uninfluenced by the state of the atmosphere.

⁂ We are glad to see that Col. W. H Eckert has been elected general manager of the Metropolitan Telephone Company. He has had years of experience, thoroughly understands the business, and we predict will make a record full of success and honor.

⁂ Gen. W. S. Huidekoper, vice-president and general manager of the Metropolitan Telephone Company, of New York City, has resigned, and William H. Eckert was elected general manager in his place. Gen. Huidekoper was formerly postmaster of Philadelphia, and wishes to return to that city, where his family are.

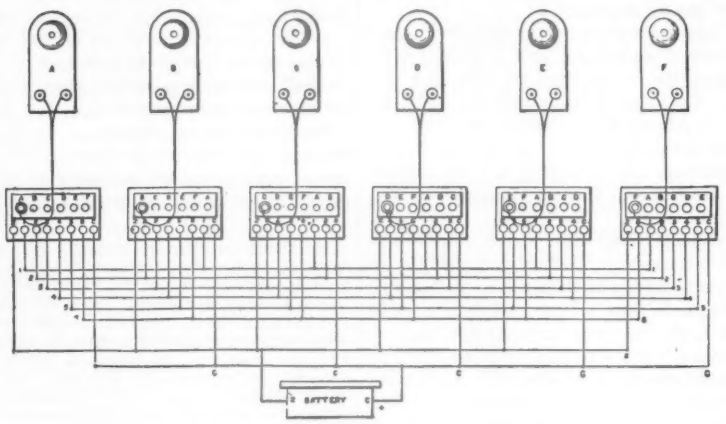
⁂ M. Garel has invented an electrical method of preparing paper stencils for letters, circulars, etc. In this apparatus a piece of very thin paper rests on a carbon block connected with one pole of a small induction coil, while the style, with which the writing is done, is connected with the other pole. On using the apparatus a series of sparks pass between the style and the carbon block, perforating the paper, which can then be used as a stencil in the ordinary way.

⁂ Three thousand dollars is offered by Mr. Ellis Lever, of England, as a prize to the inventor of a miner's safety lamp, and it has set to work the wits of the ingenious. Sir Frederick Abel will lecture on the subject during the present month in England, and probably will exhibit specimens of lamps which the Swan & Edison company are manufacturing for a large colliery in England. Electricity, it is said, is most likely to solve the question and take the money prize first and lots of profit after.

⁂ A recent time test of telephone messages was made by the St. Louis Exchange, with the following result: To force the greatest possible number of connections upon the operator in five minutes, we selected three stations, numbers 643, 627 and 611, in each of which we stationed an operator, with a list of twenty livery stables, taken in regular order from the classified list in our directory, with instructions to call each station and inquire if one of our inspectors had been there within five minutes. By the way, I want to say that we selected livery stables because they have the reputation of answering the telephone bell promptly, and we were not disappointed in that, or we could not have made this record. From station 643 we called eighteen, four of whom were busy, the balance responding. From station 627 we called twelve stations, all of whom responded, but from one of these, in reply to the question, 'Has one of our inspectors been there within five minutes?' the gentleman said, 'Hold on, I will see; I have just come on duty;' and accordingly he went around the stable to make the inquiry. This delayed the work from that source. From 611 we called seventeen stations, all of whom responded. This was a very satisfactory test, and, as I say, shows to what extent the telephone can be used when occasion demands. We feel that we can now handle the traffic as rapidly as it may come."

Swinton's System of Direct Telephonic Exchange.

Up to the present in England, whenever the number of telephones connected to the circuit exceeded two or three, it has been usual to make the connection by means of a central exchange, from which radiate the wires to the subscribers, and for town telephony this no doubt is the only practical system; but when telephonic communication is required within the limits of a building, or even those of a works, the central exchange system does not offer sufficient advantages to compensate for the cost of keeping an attendant at the exchange, and to provide for such cases Mr. Swinton has devised a system of intercommunication between a limited number of instruments without making use of an exchange center at all. In this case each instrument or station (we must not say subscriber, for virtually the instruments are all in the service of the same concern) can call up any of the other stations without interfering with the rest, notwithstanding the fact that at the same time conversation may be going on between two other stations on the circuit. We had last week an opportunity of testing this system in a warehouse in London, where six instruments are fitted in various floors and offices. In this case the telephones have been installed in lieu of speaking tubes. It is evident that to produce intercommunication between six speaking tube stations, there would be required fifteen separate tubes, whereas the communication between six telephone stations requires only eight separate wires. These wires are bunched together into a small and flexible cable, thus occupying very much less space than fifteen speaking tubes. The time for a call is not longer with the telephone than with the speaking tube, whilst the clearness of speech is very much greater. The arrangement of the circuit will be understood from our illustration (Fig. 1), whilst Fig. 2 shows the instrument at each station. It consists of an ordinary Swinton telephone, with the addition of a switch box below. When the telephone receiver hangs on the switch hook, as in our illustration, the call bell is in circuit with the two contacts of the jack plug, which is usually inserted into the hole at the extreme left of the switch box, and in this condition the instrument is ready to be called up by any other station on the circuit, as will presently be explained. When the telephone receiver is taken off the hook, it is automatically switched into circuit and the call bell switched out of circuit in the usual way. The front of the switch box is fitted with plug holes distinctly lettered with the names of the different telephone stations comprised in the system. In connection with the terminals of the telephone is a flexible cord terminating in the jack plug already mentioned, which simply consists or two metal strips separated by a piece of insulation. This can be inserted into any of the holes in the switch box for calling up the station indicated by the letter on the box. Referring to Fig. 1, it will be seen that there is only one battery (in the warehouse we inspected, where there are six stations, the battery consists of eight Leclanché cells, No. 2), and all the switch boxes are coupled in parallel, the terminals for the battery connection being marked *Z* and *C*. The other connections between the stations are clearly shown on the diagram.



SWINTON'S DIRECT TELEPHONE EXCHANGE.

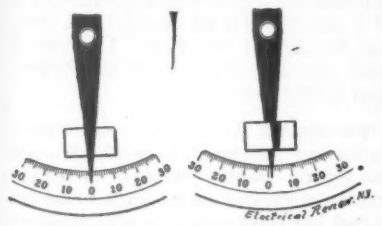
To explain the working of the system, let us assume that *A* wishes to call up *C*. He would first take off his telephone from the hook, then draw out the plug from A and insert it into the hole marked *C*, by which means the call bell of *C* would begin to ring, the ringing of the bell being notified to *A* by a loud rattling noise in his own telephone receiver, due to the current from the battery being rendered intermittent by the contact breaker of the bell at *C*. Upon *C* removing his receiver from the hook, the noise ceases, and *A* knows that he can talk to *C*, and *vice versa*. The current now goes from the positive pole of the battery, through the receiver and transmitter of *C*, through its plug *C*, to line No. 3, into the plug *C* of the instrument *A*, then through its receiver and transmitter, and back by *Z* to the negative pole of the battery. When the conversation is completed, *A* must replace his plug in the *A* hole of his switch box, so that other stations may be able to call him up if required. It is evident from an inspection of the diagram that any two stations may communicate with each other, irrespective of communication going on between any other two stations; but if *B* tries to call up *A* or *C* whilst these two are in communication, the absence of the rattling noise in his own receiver intimates to him that the line is engaged. This prevents the interruption of conversation and any possibility of confusion. If any station does not wish to be called up, as might be the case where the instrument is fixed in the principal's room, who only requires to initiate communication with the other stations, but not to be called up himself, all he has to do is to omit inserting the plug *A* in the first hole of the switchboard. All these instruments are worked with a direct battery current, and have no induction coils. But for long distances Mr. Swinton has just brought out a modification of his original instrument, in which induction currents are employed; but instead of using a separate induction coil to each transmitter, he uses the receiver of each instrument as the induction coil for the transmitter of the same instrument. The telephone receiver contains a soft iron core, which becomes magnetized by the battery current traversing the primary coil, as soon as the receiver is taken off the hook. On the same core is a fine wire coil connected to the line. The transmitter is in series with the primary coil of the receiver, and the induced current of the secondary coil goes to actuate the receiver of the other station.—*Industries* (London).

⁂ The Missouri and Kansas Telephone Company met last week and elected the following board of directors to serve during the ensuing year: George L Phillips, of Chicago; John E. Hudson, of Boston; James T. Lane, of Davenport, Ia.; John R. Mulvane, of Topeka; T. B. Sweet, of Topeka; C. D. Crandall, J. S. Chick, and W. B. Clarke, of Kansas City, Mo.; J. L. Smith, of Jefferson City, Mo. The board held a meeting immediately after its election, and chose the following officers: president, J. R. Mulvane; secretary and treasurer, C. D. Crandall; general superintendent, W. W. Smith. The formality of another incorporation was gone through with, being in accordance with the laws of Kansas. Heretofore the company has been incorporated only under the laws of Missouri. The vast amount of business it now does in Kansas rendered this step an imperative one, however.

Mr. A. E. Kennelly, a thorough and able electrician, formerly of England, now with Edison's new laboratory, delivers lectures every Tuesday evening at 8 o'clock to the employes. These interesting lectures are attended by every one connected with the laboratory, and will prove of great benefit. The lecture room is on the third floor front, well lighted and admirably arranged for the purpose.

Correct Reading of Needle Instruments.

In reading the deflection of the needle in galvanometers, voltmeters, ammeters and similar instruments, great personal error frequently occurs by failure to have the eye exactly situated above or in front of the needle. The true position is the more difficult to obtain, the further the needle is from the scale beneath it. An exceedingly simple method of insuring accuracy is shown in the accompanying figure. A small cube or parallel faced piece of plate glass is held against



the glass cover of the instrument over the needle near its end. As long as the eye is incorrectly placed, the needle will appear broken or distorted, as shown at the right of the figure; but when the eye reaches the true position, the needle will appear symmetrical, as at the left of the figure. This is a simple application of the laws of the refraction of light. The thicker the plate glass the more accurate the results.

*** The full text of the decision in the case of G. Lohse & Co., against the Mexican Telephone Company has been published. The case was decided in favor of the defendant corporation operating the Bell telephone. The chief points decided were that the previous introduction of a patented foreign article into Mexico does not deprive an inventor of the right to acquire a patent. The law does not place any fixed limit to the time for soliciting a patent. Persons attacking the validity of a patent must prove their case, and, in a case of doubt, the benefit thereof rests with the person owning the patent. This was the argument of the lawyer for the telephone company, and it won the case. It will be observed that the law is quite different from that in the United States, where Edison complains that patents are no protection, as the inventor has to prove his rights, instead of the burden of proof being on the infringer.

*** In the Circuit Court at Rochester, N. Y., last week, the trial of the case of the Bell Telephone Company, of Buffalo, against George H. Worrall *et al* was brought to an abrupt termination, Judge Rumsey directing a verdict for the plaintiff for $66.87, the amount claimed. In making this ruling the court said the contract was a one-sided one, but that was a fact with which it had nothing to do. It contained no guarantee to keep up the number of subscribers, to increase the number, to renew subscriptions or to do any business except for the plaintiff. The defendant the next day after making the contract might have discontinued all its other business, and the liability of the plaintiff upon its contract would not have been affected. The defendant had a perfect right to close up its business in the city. There was no evidence to show that the change from the flat rate to the toll system of prices was exorbitant or unreasonable. The Telephone Company, the judge said, had the same right to increase its rates for services that the grocer has to increase the prices for his goods. The only restriction in the most extended view of the case would be that the company should not be allowed willfully to impose such rates as would prevent the public from using the system. Such an act must be willfully done. If the increased rate was simply an error of judgment as to the best manner of conducting the business, it would not be willful. The ruling of the court, however, was based principally upon the first ground, that the liability of one subscriber could not be affected by the company's discontinuing its business with the subscribers or by other subscribers discontinuing the use of their telephones. The council for the defendant asked to be allowed to go to the jury on a number of questions, but Judge Rumsey directed the verdict as above given, suspending the entry of judgment and directing that the case be heard at the next General Term in the first instance.

Curiosities of Telegraph Construction in Mexico.

Like the land of Grecian fable, Mexico is a paradise girt with fire, says Frederic R. Guernsey in the Boston *Herald*. There are at least three distinct climates—that of the Tierra Fra, or Cold Land, up in the mountains; that of the Tierra Templada, Temperate Land, on the plateau, and extending down the slope toward the coast a few score miles; and, lastly, that of the Tierra Caliente, or Hot Land, which takes in the coast on the Pacific and Atlantic sides, with also some of the sloping country.

The Tierra Templada is at the north of the country, characterized by the vast treeless plains, over which must be hauled by railway, or by cart where the railway does not penetrate, the poles and wire for the lines. Oftentimes great loads of poles, cut in the forests around Toluca or Paizcuaro, in the southern part of the republic, have to be slowly and laboriously hauled over the hot plains of Chihuahua and put in place by men who carry their rations for days with them. The cost of the poles and the wire is necessarily greatly enhanced by the transportation, and it may be said that telegraph wire, placed anywhere in Mexico, costs the government three times what it did landed at Vera Cruz or Paso Del Norte.

Travelers on horseback in northern Mexico traversing these vast, treeless and melancholy plains, stop at night for camp, and, finding the telegraph poles accessible and admirably seasoned, cut them down for firewood. And this is not all. The humble ranchero, desiring a stock of wire with which to fence in an inclosure, goes with his peon servants and cuts down a mile or two for use, leaving poles oftentimes prostrate. I have myself seen poles wireless, and also long stretches of wire without poles.

And the poles brought so far at so great an expense have other enemies besides man. There is the insignificant-looking worm, the "jengen," which insidiously honeycombs the poles till some fine day they fall at the breath of a breeze, strewing fragments of wood over the ground. This is a formidable opponent of telegraph communication in Mexico, and any bright American who can show how to keep it out of the poles may fairly demand a reward from the Mexican government.

"Y los pajaros son enemigos tambien" (and the birds are also enemies). There is a Mexican woodpecker who sits up toward the top of the poles and pecks and pecks for whole days, till the top comes off and cross-arms go too. A great rogue is this Mexican woodpecker, the sworn enemy of telegraph poles. The linemen (celadores) shoot him when they can, but of what use? One dies and forty come after to the funeral!

And then the white ants, those industrious, unseen hollowers out of timber. These tiny creatures will eat out the inside of a pole till it is a mere shell, solid apparently, sturdy seemingly, but absolutely as good for nothing as an eggshell. Up comes the wind, and the poles blow away as if they were hornet's nests detached by a cyclone. These "hormigas blancas" dig out the inside of house timbers in some parts of the country. They have even been known to so hollow out the legs of a dining table that one day down it came with all its crockery and the noonday meal, too. The hormiga blanca is also the sworn enemy of civilization and progress as represented by the telegraph.

But the Hot Land has its enemies of telegraph also. How Mayne Reid, or Ballantyne, or Verne would have seized on the facts here presented. Picture to yourselves, good friends on seaside piazzas or lounging on mountain tops this summer day, a country of impenetrable vegetation, with gigantic palms and plantains, with jungles so dense that it is hard work with a stout and sharp machete to make a path through them, a country of intense heat, of innumerable mosquitoes, and ticks, and malaria, and snakes, and vegetation that grows up in a day to a height that interferes with the labor of man.

Such are some parts of the Mexican States of Tabasco and Yucatan, and it is through such regions that the telegraph which connects the Mexican capital with important points like San Juan Baptista or San Cristobal must penetrate. This is the country where the linemen go in couples, and armed with rifles to fight off the fierce "puma," or Mexican tiger (tigre), who assaults man and is especially ravenous for telegraph constructors. The Mexican linemen down in the hot coast country shoot many a puma while out attending their lines.

A scarcely less formidable antagonist is found in the monkey tribe which inhabits the jungles and chaparral of Tabasco. Literally "the woods are full of them." Their favorite diversion, when not in quest of food, is to betake themselves to the telegraph lines for gymnastic exercises, and linemen assert that often one hundred able-bodied monkeys may be seen swinging on the wire, festooned, monkey fashion, by looping their tails. The continuous vibrations of these forest gymnasts start the iron nails used on the cross-arms, and these often come down, bringing the wire with them.

And it is not a safe matter to undertake to disperse these robust monkeys who play the dickens with the telegraph lines in the sparsely inhabited State of Tabasco. Linemen have found that on shooting a monkey swinging on the wire they have been pursued by a whole regiment of monkeys. "It is no joke (no es broma)," said a lineman recently, "to have a tribe of monkeys pursue one; they are very strong (muy fuertes), and can hit with a stone or stick in a fashion to make a man howl with pain—a thing the monkeys enjoy hugely.

In the coast country, especially on the Gulf of Mexico side, the wires, from the humid condition of the air, oxidize rapidly, and a wire is found by experience to be in need of replacement in a year's time. This adds heavily to the cost of keeping up the service.

Still another difficulty in maintaining a good service in the Hot Land States is the impossibility of acclimating, in many regions, telegraph operators from the colder table lands. They easily fall a prey to fevers, and, if they escape with their lives, they have been away from their posts and the service has suffered. So it has been found necessary to make use of natives of those regions, often imperfectly educated, and from whom much must be borne, perforce, for they make blunders with fatal facility, and try the patience of the City of Mexico officials to a degree.

Spanish Telegraph Statistics.

The general Board of Posts and Telegraphs in Spain have just issued the telegraph statistics for the second half of 1886. The publication of such statistics after the lapse of twelve months may seem late, but a leading Madrid paper says that the delays in compiling official statistics in Spain are so great that it is a matter of congratulation that they should have appeared so soon. It appears from the statistics that at the 31st December last the length of overhead telegraph wires in Spain was 18,419 kilometers, underground wires 144 kilometers, and submarine wires 236 kilometers. The number of dispatches during the six months, distinguishing internal and foreign, private, public, and service messages, was as follows: Interior—official, 186,453; service, 53,508; private, 1,176,507. Foreign—official, 6,100 messages dispatched and 4,383 received; private, 180,952 sent and 202,826 received; and transit messages, 50,593. The revenue amounted to £134,270. The total number of messages for the twelve months ended 31st December last was 3,549,860, of which 801,656 were international, and 2,748,204 were internal. Of the latter, 372,407 were official, 108,323 were service telegrams, and the rest —2,267,574—private. The year's receipts were £237,515, and the expenditure £308,440, in the proportion of £195,025 for *personnel*, and £114,415 for lines, stations, etc. There was, therefore, a deficit for the State of some £70,925. The Spanish telegraph service certainly seems to be going from bad to worse as a source of revenue. The *Dia* of Madrid, commenting upon the result, says that four years ago, viz., in 1882, the length of line was 16,744 kilometers, and the total cost was £193,875. Since then the addition to the wires has only been 1,675 kilometers, but the expenditure has increased by some £114,565, while the revenue has increased £40,790. It would therefore appear that the Spanish telegraph service, which was profitable in 1882, has now become a serious loss to the State.—*London Electrician.*

TELEGRAPHIC

.... The Consolidated Railway Telegraph Company, H D. Hall, secretary and treasurer, has moved its office from 13 Park Row to the Boreel building, 115 Broadway.

.... At a recent meeting of the Boston R.R. Clerks' Association, Mr. J. G. Baker, of the N. Y. & N. E. R. R presented many interesting facts in regard to the subject of telegraphy, especially as applied to railroading.

.... Messrs. Partrick & Carter, of Philadelphia, have just issued their 1888 electric bell catalogue and general price list, comprising an interesting pamphlet of about 70 pages. They will forward a copy to all who desire it. The catalogue is thoroughly illustrated.

.... An Austrian lieutenant named Giessle, of Brunn, is said to have developed an idea, which is, perhaps, more strikingly original than practically useful. He proposes that every railway train should be preceded by an *avant-courier* in the shape of an electrical pilot-engine—attached, we presume, by wires to the advancing train.

.... The Telegraphers' Aid Society of Philadelphia has been organized, with the following officers: President, Joseph E. Janney; vice-president, Joseph Barrett; recording secretary, C. B. Wood; financial secretary. Robert C. McCready: treasurer, H. W. Hetzel. Executive Committee—Miss Emilie W. Uhlinger, W. E. Vanarsdall, E. Louis Maize, A. H. Lang and Thomas Dillon.

.... The Home Telegraph Company, of Kansas City, Mo., has filed its articles of incorporation. Its stock of $100,000 is held equally by Thomas E. Gaines, Charles E. Kearney, P. H. Madden, Frank P. Perrin and John W. Spears, all of Kansas City. The object of the incorporation is to own and operate telephone and telegraph systems and to establish, maintain, operate and lease a system of communicating by messengers, messages and signals by means of such systems.

... Randall Wilson has served very acceptably as "check" in the Western Union office at Wichita, Kas., and last week was given a position as telegraph operator. This was made a very formal and elaborate affair, and he was presented with an address by the manager and chief operator, reading as follows: "As a token of our appreciation of your faithfulness as an office boy, we hereby extend to you the position of telegraph operator, a position only excelled by one, the presidency of the United States. In accepting this position, do so with the determination that you will be as faithful in your duties as an operator as you have been in your struggle to ascend to that noble position. We now extend to you the right hand of fellowship."

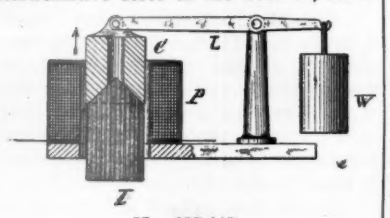
.... At the annual meeting of the stockholders of the Pacific Mutual Telegraph Co., in Kansas City, the following directors were elected: E. L. Martin, Dwight Townsend, L. D. Parker, George M. Meyer, J. A. Corbey, C. H. Reid and Ed. S. Stokes. The directors then elected the following officers: President and treasurer, E. L. Martin; secretary, Dwight Townsend. It was decided to begin early in the spring, as soon as the frost is out of the ground, to push the extension of the line through Kansas to Denver, Col. In the neighborhood of 500 men will be put to work on this extension, which it is expected will be completed by the latter part of July or August. About one thousand miles of pole lines will be built on this extension. To the general public the Postal and the Pacific Mutual Telegraph Companies are the same, and even the initiated find it difficult to draw the line between them. While the Pacific Mutual is extending from Kansas City to Denver, the Postal is extending from San Francisco to Denver. A force of about 2,000 men will be employed on the latter extension.

ELECTRICAL AND SCIENTIFIC

We illustrate herewith a few of the important patents taken out Jan. 31:

Extract from patent No. 377,217, of Elihu Thomson, Regulating device for alternating current circuits. Jan. 31, 1888.

The alternating currents passing in coil *P* will tend to pull the core *I* into the coil, and at the same time will tend, through the presence of the induced electric currents in the conductor *C*, to repel the latter out of the coils, the resulting force being summative in character, and exerting a push or pull tending to move two parts together in an upward direction. This movement, or tendency to movement, may be utilized in any desired manner. There will also result from such a movement an increase of reaction or counter electromotive force in the coils *P*, which

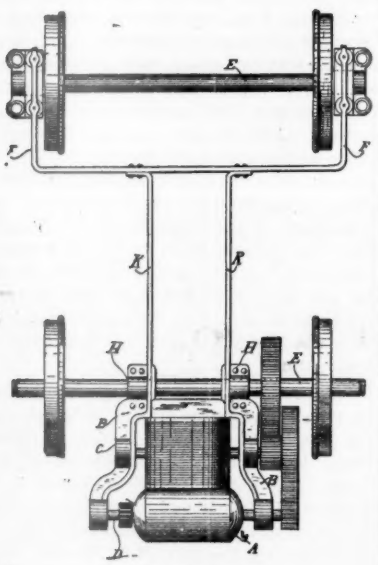


No. 377,217.

will tend to cut down the current in said coils. This is due to the fact that the magnetic core *I* is moved farther into the coils, while the closed conducting mass of *C* is moved farther away from the inducing field or coils, so that less of the current in coil *P* is expended in the inductive action of setting up currents in said conductor. So long as the conductor *C* remains in the coil the current in the coil (in part) spends its inductive action in setting up currents in the conductor instead of counter electromotive force or reaction by self-induction.

Patent No. 377,229, E. M. Bentley, Electric locomotive. Jan. 31, 1888.

A represents the motor. *B* is a framing extending from the yoke of the motor and supporting the armature shaft *D*, and the countershaft *C*. This frame is journaled on the axle *E* at *H H*, and has an extension *K F* projecting across to the journal boxes of the opposite axle *E'*, and secured to them through intermediate springs, one in the line of upward and the other in the line of downward pressure of *F*.

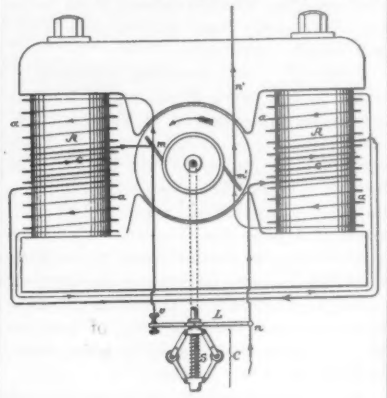


No. 377,229.

The motor is geared to the axle *E*, as shown, and it will be seen, the motor being fulcrumed on one side of the axle, and counterbalanced on the opposite side by means of the other axle, that axle *E* receives all the weight of the motor, and also a part of the weight normally falling on the other axle. The car body is supported from the truck by springs in the usual manner.

Patent No. 377,255, D. Higham, Regulation of electric motors. Jan. 31, 1888.

The operation of this regulation is then as follows: When current is switched into the motor, rotary motion is imparted to the armature, and the speed increases until it reaches the desired rate. The speed is then prevented from further increasing by the controlling device *C*, which reduces the attractive energy of the field-magnet by throwing the opposing coils *c c* into circuit. This would reduce the speed below the desired rate, but it is prevented by the controlling device *C*, which increases the attractive energy of the field magnet by establishing the short-circuiting around, or, in other words, cutting out, the opposing coils *c c*. By this means the speed is prevented from increasing above or decreasing below the desired rate. In order that this regulation may not be



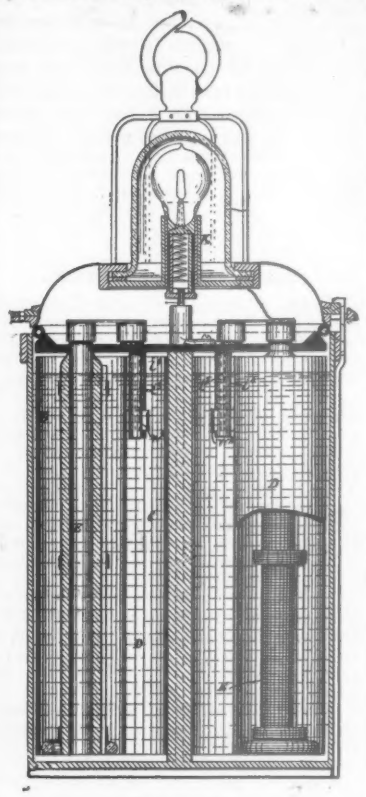
No. 377,255.

spasmodic in its action, the controlling device *C* should be of the most sensitive nature—that is to say, a variation of one revolution in a hundred should be at least capable of effecting regulation. Therefore the contact at *v* will be rapidly made and broken, and on account of the self-induction and inertia of the shunt coils *a a*, the attractive energy of the field magnet will not be raised and lowered to its maximum and minimum at each impulse.

Patent No. 377,340, Urquhart & Nicholson, Galvanic battery. Jan 31, 1888. English Patent, No. 7,506, of 1887.

This invention has for its object to provide a battery simple in construction, occupying but a small space in comparison with its power, and readily and economically regenerated or put into a condition for renewed work after it has become exhausted.

In order to regenerate the negative elements, when they consist of or carry chloride of silver, we remove the said elements from the battery and place them in a bath of hydrochloric acid, or of chloride of sodium,



No. 377,340.

potassium, or zinc; or the bath may consist of or contain the spent liquor of the battery. Through this bath, while the elements to be regenerated are immersed therein, we pass an electric current, using what were the negative elements in the battery as the positive electrodes in the bath, the negative electrodes in said bath being any conductor usually employed in analogous processes. This latter method is also used in cases where the negative elements consist of or carry peroxide of silver. When the spent liquor is used as the bath, we recover by that means the metal in solution therein, while at the same time we regenerate or reconvert the elements and obtain an electrolyte fit for use in the battery. The construction of the battery gives great facilities for this revivifying process, by reason of the negative elements being connected to a single plate in the manner herein described, which permits them to be easily handled, and the requisite manipulation of the revivifying process being performed with great rapidity and without any danger of the loss of any of the silver.

OUR ST. LOUIS LETTER.

(From a special correspondent of the ELECTRICAL REVIEW.)

Malaria, fogs, big snowstorms and a bit of remorse occasioned by eating a piece of pie in a town in southern Kansas has prevented the mailing of my usual weekly letter. But now that the sun is shining from behind the clouds, the malaria all gone, it would seem that matters electrical should be looking up.

C. A. Brown, Manager of the Western Electric Company, Chicago, has been in the city for a few days and closed contract with the St. Louis Exposition for 150 arc lights. I am sure that the Exposition will never have cause to regret their choice of system, as, aside from the fact that the machinery is first-class, it is a genuine pleasure to deal with the company and its representatives.

Mr. Brown informed me the ever young and always pleasant Col. Beetle will soon take a trip through Dixie. If the Colonel will only take my advice he will declare his intentions as soon as he reaches his destination by writing in a large round hand, Col. Geo. L. Beetle, Chicago, Republican by Gad, sah. Then, his ideas on politics being known and settled in the minds of our southern brethren, he will be able to settle down to hard work without any further remarks concerning his political religion. The U. S. Company's representative, C. D. Shain, was in the city last week, trying to dispose of a plant to the Mercantile Library Association, but as yet the matter is undecided. The Western Electric Lighting Company started their Westinghouse plant last week, but as yet have not got down to proper bearing. Mr. Baird, the company's manager, is a hard worker and will soon have things going smooth.

The Anna, Illinois, Electric Light Company, W. Henderson, president, have decided to use the Edison system, and are now placing their machinery under the supervision of J. F. Porter, electrician to the Edison Company. Mr. Porter is now placing the wires in the Mercantile Library building, in accordance with the rules governing Edison installations for a plant of 1,000 lamps. A committee from Fayetteville, Arkansas, are looking up a system of lighting for their city, and think that before they leave the city will close the deal. Arkansas is not dead, as many people have supposed, but simply taking an afternoon nap. A company has been organized at Helena, Arkansas, with $25,000 capital, and the usual committee is in the field, looking up the genial agent, who, I am sorry to say, at times promises everything, and often fails to make his promises good. The business of electric lighting is gradually reaching the stage of square, honest dealing, and a class of agents coming forward to the front who consider their reputation for honest dealing as being something worth considering. The style of agent that some years ago would tell a would-be purchaser that an arc lamp would, if placed high enough, light the entire town three miles from center to circumference so brightly that it would be impossible for the citizens of said town to go to sleep until a shade was put over the lamp, and in the same breath sell a shade, together with a work on "Facts concerning how to purchase an Electric Light System," and detail how important to the business community it was to know how to tell an honest man from a rogue. Those days are passed, let us hope. Now and then a stray Missouri colonel with fire in his eye and a strong smell about his person generally, comes to the city looking up the man that told him six arc lamps could be operated to the mechanical horse power, but is told that the person he is in quest of has just gone to Chicago. Mr. Hix, special agent of the Edison parent company, is in Kansas City, assisting in the detail of the Illuminating Company. Mr. Ford S. Caldwell, secretary of the Western Electric Construction Company, of Kansas City, has ceased take his meals alone, and in the future will conform to the ideas of Mrs. Caldwell concerning regular attendance at dinner and church.

Mrs. Caldwell, *nee* Miss Mary Noble, of New York city, is a most charming lady, and Ford is to be congratulated. That they may live long and prosper is the wish of his friends, and their name is legion.

R. A. H.

St. Louis, Mo., Jan. 31, 1888.

General Business Notes.

The Bridgeport Brass Company held its annual meeting Jan. 26th. The year 1887 was reported as being a prosperous one for the company, and the same board of officers were re-elected. The strong hand of Col. Fred. A. Mason continues at the helm of this large corporation.

The Baxter Motor Company, of Baltimore, has placed a 10 horse power at 26 Laight street, in the warehouse of A. D. Juillard. It is now running two freight elevators, each of a capacity of 2,500 pounds. Mr. Juillard has ordered four more. A number of other motors are being put in by this company in New York.

The Sprague Electric Motor has just issued a neat little book called "Facts as to the Sprague Electric Motors." It is fully illustrated, showing the motors in actual use in their varied applications, and is a departure from the dry regulation catalogue, its facts and figures being set forth in an interesting manner.

Mr. J. N. Pratt has accepted the general management of the Jarvis Engineering Company, in place of Mr. A. F. Upton, who has resigned on account of poor health, and who leaves on a southern trip of six months' duration. Mr. Pratt is an experienced, capable engineer, and we predict will make a fine record as the responsible head of this big engineering company. The New York office, which has been under Mr. Pratt's management, will be continued, and the general offices will still be in Boston.

The Electric Gas Lighting Company has just issued a very complete new catalogue. Col. L. W. Burnham, the energetic general manager of the company, has been at work on it for some time, and the result is a very handsome book, fully illustrated, a copy of which, every one interested in electric appliances and apparatus of all kinds should have. The cuts are exceptionally good, many of them having been made especially for this book. The last few pages are devoted to directions for running batteries, putting on automatic burners, wiring fixtures, etc., and a complete plan for wiring a house is also given.

The constant increase in popularity of electric light in Kansas City has led the stockholders and directors of the consolidated electric light companies (the Kansas City and the Edison) to consider seriously the advisability and practicability of putting their wires under ground. So far have matters progressed that it has been practically decided to bury the incandescent light wires. The improvement will involve a large outlay, but if the money can be raised by increasing the capital stock, and there is no doubt that it will be readily forthcoming, the work will begin during the coming season. This work will necessitate a capitalization of $400,000. The arc wires will remain above ground.

In a recent published interview, Mr. F. J. Hastings, of the Edison Company, in speaking of the new applications of electricity, mentioned experiments relating to the use of the incandescent lamp for giving light beneath the water. Two days later he received a visit in his Broad street office from an individual whose every appearance was that of a native from "Wayback." He proved to be a committee of one sent by the oystermen of Port Jefferson, who had read Mr. Hastings' remarks, and who desired to use the electric light in discovering the whereabouts of the schools of star fish which acccumulated on the oyster beds, following the tide, and destroyed them. The fisherman's idea was that, by means of the electric light, the enemy of the ever popular oyster could be located, and promptly dredged off, and before he left arrangements were made for giving the matter a thorough trial, with every prospect of a successful solution of the problem that has exercised the minds of the Port Jeffersonites for many seasons past.

A "Practical Sermon."

Just before dark, on a recent Sunday, passers-by were attracted to the fluttering of a sparrow in the globe of the electric light at the corner of Tremont and Worcester streets, Boston. The bird did not possess the instinct to escape at the top, whence it entered, but frantically endeavored to free itself by struggling against the sides. The party watching expected every moment that the current of light would be let on, and felt the horror of witnessing the little creature perish. A gentleman and lady, very fashionably dressed, came along and joined the watching party. The gentleman waited but a moment. He handed his cane to the lady with him, divested his hands of his tight-fitting gloves, and attempted to climb the snowy, slippery pole. The first three attempts proved futile, and the elegant clothes of the gentleman suffered badly, as his grip relaxed and he slid back to terra firma. But at last he succeeded in reaching the top, and, putting his hand inside the globe—at great risk, as the electric current might have been turned on at that moment—he caught the little creature and tossed it into the air, the bird flying away. "That," said a bystander, 'is worth more to me than this morning's sermon."

—— There has been a fair amount of speculative buying of copper stock by the syndicate this week, but the leading manufacturers still continue to purchase sparingly. It is believed that some will be short of stock about the end of the month. The Calumet & Hecla are making preparations to thoroughly flood their mine with carbonic acid gas. The market closes at 16.40 spot and 16.56 @ 16.55. February ; 16.66 @ 16 65c., March.

—— The Mather Electric Company, Manchester, Conn., whose Boston agents are Messrs. Clablin and Kimball, 143 Federal street, has recently completed the following installations of their system of incandescent lighting: Hotel at Fall River, 600 lights ; Gleucoe Starch Works, Staten Island, 500 lights ; Caribou, Me., 250 lights ; Fairfield Paper Company, Salmon Falls, 150 lights ; Globe Yarn Mills, 300 lights ; Dubois Manufacturing Company, Fall River, 50 lights ; Electrical Improvement Company, San Francisco, 450 lights ; Warder, Bushnell and Glessler, agricultural implement makers, Springfield, Ohio, 800 lights ; Ingram's Clock Company, Bristol, Conn., 500 lights ; Romsey Brothers, Mansfield, Mass., 300 lights ; Tewksbury State Almshouse, 500 lights ; Norton Emery Wheel Company, Worcester, Mass., 75 lights ; Cyclorama of Bunker's Hill, Tremont street, Boston, 50 lights ; Chambers Brothers, Truro, N. S., 25 lights ; Agawam Paper Company, Mittineague, Mass., 200 lights.

—— The Athens (Tenn,) Mining and Manufacturing Company intend erecting an electric light plant at an early day.

—— The Helena (Ark.) Electric Light and Power Company of that city has been organized. Capital stock, $25,000. James Summers is president, and Jacob Trieber, secretary.

—— The Rutland Electric Light Company, of Rutland, Vt., are increasing their capacity, having found the demand for the electric light in that city in excess of their power to fill.

—— Houston, Texas, has given a five years' contract for 100 arc lights, and in addition will soon have 2,000 Slattery incandescent lamps. There will probably be a demand for 100 arc lights for commercial use.

—— The Edison Electric Light Company, of Baltimore, has been incorporated. It proposes to light streets, residences, and other buildings, and provide motive power for machinery. The company intends to place all its wires underground.

—— The managers of the London Underground Railway have recently contracted for an electric locomotive, to be of the same power as the steam locomotives used now. If the trial engine is a success, electric machine power will be adopted by the road.

—— An electric light plant is to be erected in Marshfield, Wis.

—— David Barnes is interested in an electric light plant to be established at Spencer, Mass.

—— The Standard Gas Company will erect extensive works at North Beach, California.

—— At the last meeting of the Board of Aldermen of Sherman, Texas, a committee was appointed to look after a street lighting system preceding the termination of the city's contract with the Sherman Electric Light and Power Company on February 1. The committee has decided in favor of the city establishing an electric light plant of its own, or of buying the plant of the home company.

—— An electric light company has been formed at Leicester, Mass., for lighting the streets and different manufacturing concerns in the town. E. L. Watson, of the firm of L. S. Watson & Son, is president, W. J. Whittemore, of the firm of W. & J. Whittemore, is treasurer, and Harry Sargent, president of the Leicester Wire Company, is manager. It has put in the Thomson-Houston system of electric lights, which gives, of course, much satisfaction.

ELECTRIC LIGHT NEWS

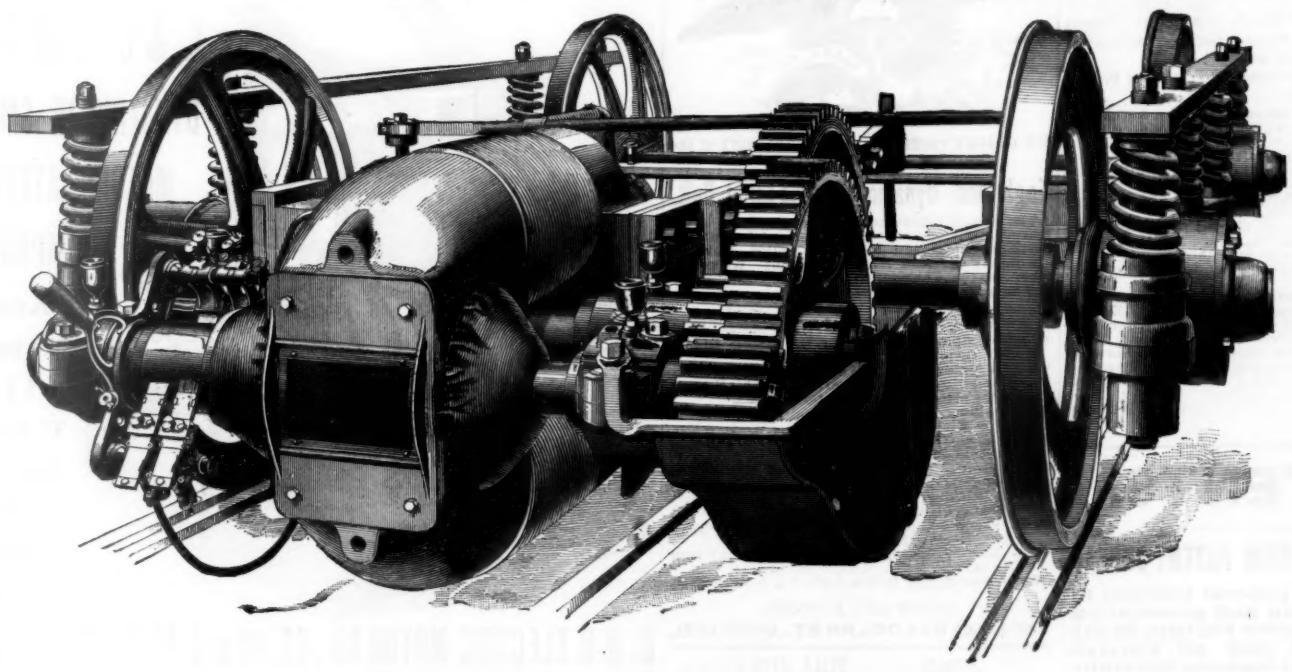
—— Booneville, Mo., wants an electric light plant. Now, boys, don't all go at once.

—— The Allegheny Electric Light Company, Allegheny City, Pa., have a capacity of 13,500 lamps and are running over 11,000.

—— The Fayette Electric Light Company, Uniontown, Pa, has been incorporated. Capital stock, $5,000. G. S. Harah, and others, incorporators.

—— Treasurer W. G. Phelps of the Binghamton, N, Y., Electric Light Company, sent a check for $100 to the firemen of that city for prompt and efficient service during a recent fire.

—— The New York office of the Thomson-Houston Electric Company has been removed from 32 Nassau street to the Boreel building, 115 Broadway. Mr. H. N Curtis and C. R. Dean are in charge.



Bentley-Knight Standard Truck for Electric Motor Railways.

The Bentley-Knight Standard Truck.

The inventors and electricians of the Bentley-Knight Electric Railway Company have been doing a great deal of quiet but persistent work in improving all the details of their well-known system. Much depends on the success of the motor car as a mechanical structure, in any electric railway, on account of the numerous and complex conditions besetting the details. The above company have fully realized this, and have put forth much effort in the direction named; and the result is given to our readers in the annexed illustration of their standard truck for street cars, wherein every condition seems to be provided for. The motor is pivotally hung on the axle through the yoke of the field magnet, and the armature shaft carrying the small driving pinion, engages a large spur wheel journaled in a frame swinging with the motor, and therefore always in exact position. On the shaft of this spur wheel a second pinion engages a spur wheel keyed on the car axle. Thus, no matter how much oscillation takes place, the gear system is always maintained in normal and exact relations because it is all hung on the same center, *i. e.*, the axle of the drive-wheels. A frame bolted to the system extends back to the other pair of wheels, and is cushioned betweeen springs which soften the jar, whether the latter be communicated upwardly or downwardly. Such construction should permit the use of accurately cut gear, and be noiseless, and prevent wear of the teeth.

—— The Delphi Electric Light and Power Company, Delphi, Ind., has been incorporated with a capital stock of $10,000.

—— The American Electric Light Company, Kansas City, Mo., has been incorporated. Capital stock, $25,000. M. S. Porter, and others, incorporators.

—— The Mount Morris Electric Light Company yesterday obtained from Judge Andrews, in Supreme Court Chambers, a temporary injunction restraining Commissioner of Public Works Newton, and John Richardson, the superintendent of the bureau of incumbrances, from interfering with or removing certain lamps and poles erected by the company.

—— The Edison Illuminating Company of Detroit has elected George Peck president, E. W. Voigt vice-president, S. R Mumford treasurer, C. P. Gilbert secretary, Hoyt Post attorney, and George Peck, Simon J. Murphy, E. W. Voigt, S. R. Mumford, J. R. McLaughlin, George F. Moore, C. P. Gilbert, Robert McMillan and F. S. Hastings, directors. Mr. McLaughlin, who organized the company in April, 1886, and has had charge of the business management up to the present time, resigns for the purpose of taking a position with the parent Edison Company of New York city. He has been appointed their agent for the State of Ohio, and will devote his entire time to the organizing of Edison central stations similar to the one in this city. Mr. C. P. Gilbert will probably take his place.

—— Mayor Reginald Helm, of Hagerstown, Md., is desirous of having his city illuminated by electricity, and wants information on the subject. There are a number of gentlemen, we are confident, who can give all the information desired.

—— Articles of incorporation of the American Electric Light Company, of Kansas City, have been filed with the county recorder. The capital stock is $25,000, divided into 250 shares, which are taken as follows: M. S. Porter, 175 shares ; H. M. Porter, 49 ; O. W. Ditsch, 26.

—— According to the books of the City Works Department of Brooklyn, there is available this year for the street lighting contracts the sum of $483 132. The annual appropriation was $480,000, and on the 1st of January there was a balance unexpended of $3,132. Last year $177,138 was spent for electric lights, and $220,902 for gas lights, a total of $398,040. The number of electric lights is 1,007, and of gas lights in use 10,-265.

—— The contract for heating the new silver vaults of the Treasury has been awarded to Messrs. Johnson & Morris, of that city. Work will be begun at once, and rapidly pushed. The contract for lighting is held in abeyance, pending the discussions of the heads of the department concerning the establishment of an electric light plant in the building. In case they decide to abandon this plan, wires will have to be run in from the lines of the Electric Light Co.

ELECTRICAL PATENTS

(Copies of any Patents in the following List wil be sent to any address on receipt of twenty-five cents.)

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING JAN. 31, 1888.

377,021 Electric temperature regulator; Lucien F. Easton, La Crosse, Wis.

377,046 Armature for dynamo electric machines; Edward J. O'Beirne, Elgin, Ill., assignor by direct and mesne assignments to the National Electric Company, same place.

377,073 Protecting device for electrical apparatus; Angus S. Hibbard, New York, N. Y., assignor to the American Bell Telephone Company, Boston, Mass.

377,083 Electrical auxiliary signaling system; Geo. F. Milliken, Boston, Mass., and Henry B. Lytle, Providence, R. I.; assignors to the Gamewell Auxiliary Fire Alarm Company, Boston, Mass.

377,107 Electric railway; Rudolph M. Hunter, Philadelphia, Pa.

377,110 Telegraph instrument; William S. Logue, Baltimore, Md.

377,118 Insulating electric conductors; Rupert Shefbauer, Dresden, Saxony, Germany, assignor to Weber and Schefbauer, same place.

377,210 Electrolyte compound; George B. Pennock, Brooklyn, N. Y.

377,215 Traveling current collector for electric railway motor cars; William M. Schlesinger, Philadelphia, Pa.

377,229 Electric locomotive.

377,250 Electric motor; Edward M. Bentley, New York, N. Y.

377,237 Plug switch for telephone and telegraph circuits; George H. Cole, Atlanta, Ga.

377,255 Regulation of electric motors; Daniel Higham, Philadelphia, Pa., assignor to the Higham Electric Motor Company, same place.

377,256 Electric annunciator; John W. Hoffman, Pullman, Ill.

377,319 Electric motor; Charles T. Mason, Sr., Sumter, S. C., assignor to the Maryland Electric Motor Manufacturing Company, of Baltimore city.

377,340 Galvanic battery; David Urquhart, Westminster, and Benjamin Nicholson, South Norwood Park, County of Surrey, assignors to the New Portable Electric Lamp and Power Syndicate Company (Limited) London, England.

377,344 Railway telegraph; Charles W. Williams, Cave City, Ky.

PATENTS.

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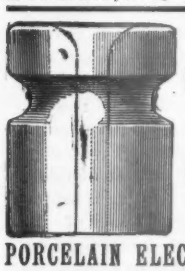

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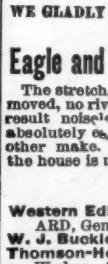

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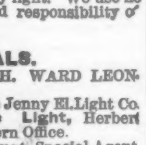

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W. J. Buckley, Mgr. Ft. Wayne Jenny El. Light Co.
Thomson-Houston Electric Light, Herbert Wadsworth, Manager Western Office.
Brush Electric Co., Alex. Kempt, Special Agent.
Excelsior Electric Co., C. J. Reilly, Western Mgr.
Sperry Electric Light Motor & Car Brake Co., 201 Royal Insurance Building.
J. H. Reid, General Manager of the Mather Electric Light Co., Chicago.
Wm. H. Purdey, Comm. of Public Works, Chicago.
John Mab, Chief Engin'r of Board of Trade, Chic.
C. J. Melmes, Gen'l Sup't Thomson-Houston Light, Omaha, Neb.
J. A. Corbey, St. Joe Electric Light and Power Co., St. Joe, Mo.
Wm. Oswald, Agt. Edison Light Co., New Orleans, La.

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